

COAL AGE

MAY, 1959

Thin-Seam Stripping . . . p 80

Cables for AC Mining . . . p 90

Slab Fork Maintenance . p 104

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PRICE \$1



Badger Mining Preparation . . . p 70

Constant and combined research at the MSA and Edison Laboratories determines the quality components of Edison Electric Cap Lamps and charging equipment. This team helps to improve battery performance, increase headpiece light output, and develop efficient charging methods.

Built-in →
quality here



increases safety and dependability here



This miner gets dependable full shift illumination from the two equally rated filaments of the Edison R-4 bulb. No lost time, no lost production due to bulb burnouts underground.

Edison R-4 Cap Lamps give mine operators more productive man-hours

Mechanized mining places heavy demands on underground illumination. That's why peak efficiency in a miner's cap lamp is so vital.

The miner's safety depends on it. His tonnage output per shift certainly hinges on it. And so do your total labor and production costs.

We'd like to talk with you about these costs—hidden downtime costs—and the role the Edison R-4 Electric Cap Lamp plays in reducing them.

There are a number of advantages inherent with the R-4 Lamp which we'd like you to consider. Such things as amount of reserve working light available, long and dependable battery life, choice of self-service charging systems, positive watering method, maintenance-free storage, and prompt service in all mining areas.

An MSA representative will be pleased to present this entire story to you. A practical demonstration can be arranged at your convenience. Write us for details.

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No ventilation stoppings needed, mine saves \$5400 a year

B. F. Goodrich improvements in rubber brought extra savings

Problem: Operators of this West Virginia mine had a choice of two ways to protect against the possibility of a conveyor belt spreading fire in their modern, new mine. They could use an ordinary conveyor belt and build ventilation stoppings in the cross ducts along the belt line to prevent main air supply from feeding a fire, or they could use a fire-resisting belt.

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Where to buy: Your B. F. Goodrich distributor has full information on the conveyor belt described here. And, as a factory-trained specialist in rubber products, he can answer your questions about all the rubber products B.F. Goodrich makes for industry. B. F. Goodrich Industrial Products Company, Dept. M-579, Akron 18, Ohio.

B.F. Goodrich *fire-resisting conveyor belts*

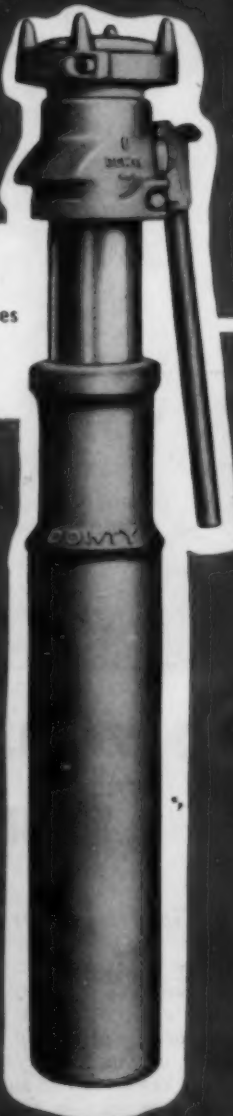
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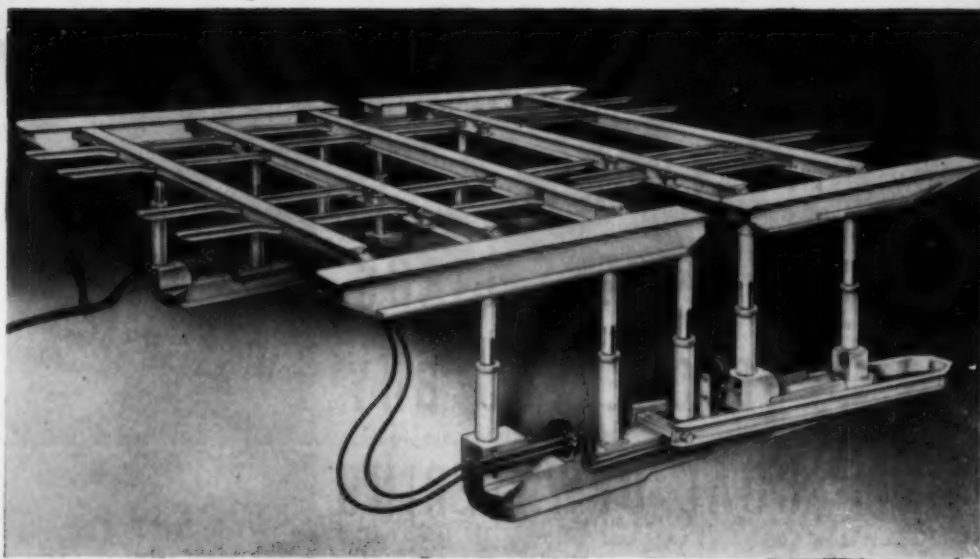


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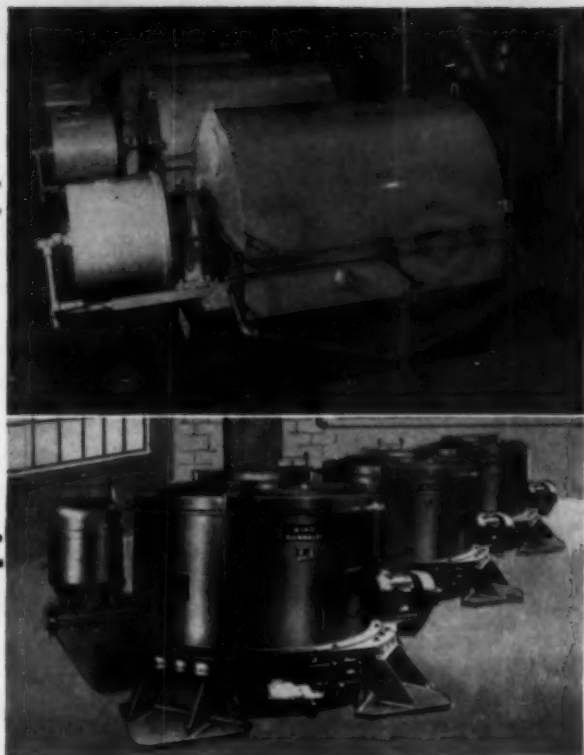
*World Pioneers of
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Fully automatic
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longwall mining



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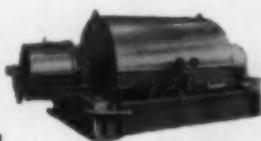


28 MESH x 0



the Bird Solid Bowl Centrifugal "Polisher" dewater cyclone, thickener or flotation products — gets the fines drier than any other mechanical means — does the job at low cost per ton.

1/4" x 28 MESH



the Bird Solid Bowl Coal Filter has unique advantages; for example, on table feeds, which are handled as is, without pretreatment.



the Bird-Humboldt Oscillating Screen Centrifuge gets the coal 95% dry with minimum power (1/4 HP per ton of dried coal) and maximum screen life (up to 3000 hours).

1" x 1/4"



the Bird-Humboldt Oscillating Screen Centrifuge dewater stoker-size coal with almost no degradation and at exceedingly low cost per ton. Detailed data will be mailed on request.

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This Month in MAY 1959

COAL AGE

Features This Month:

Editorial: "Industry of Distinction".....	p 69
Badger Coal's Modern Preparation Undergirds Productive Mining	p 70
Efficient Thin-Seam Stripping Serves Utility Market	p 80
Cable for AC Underground—Choice and Installation	p 90
How Central-Shop Facilities and Service Pay Off at Slab Fork Coal	p 104
40:1 Ratio and Feldspar Jig Highlight Avon Strip Progress	p 110

Departments This Month:

Coal Commentator .p 11	News Roundup .p 26
Foremen's Forum .p 114	Operating Ideas .p 122
Equipment Developments .p 126	



► Deep Mining, Preparation

Badger Coal's Modern Preparation Undergirds Productive Mining p 70

A. E. Flowers, Associate Editor, *Coal Age*

Efficient underground mining that produces up to 44 tons of raw coal per face man from a 46-in seam, plus modern preparation facilities that upgrade to a quality product a coal previously considered too dirty to mine, are foundations for successful operation at Badger Coal's No. 10 mine, Philippi, W. Va. Employing

conventional off-track equipment 11-man crews load an average of 16 cuts in rooms and headings. Badger's preparation plant takes a raw feed containing 50% reject and 18 to 20% ash and upgrades it to 8 to 8½% ash, 1.7 sulphur and 13,700 Btu as received.

High Spot—How Badger solved coarse-coal and fine-coal cleaning problems.



► Stripping

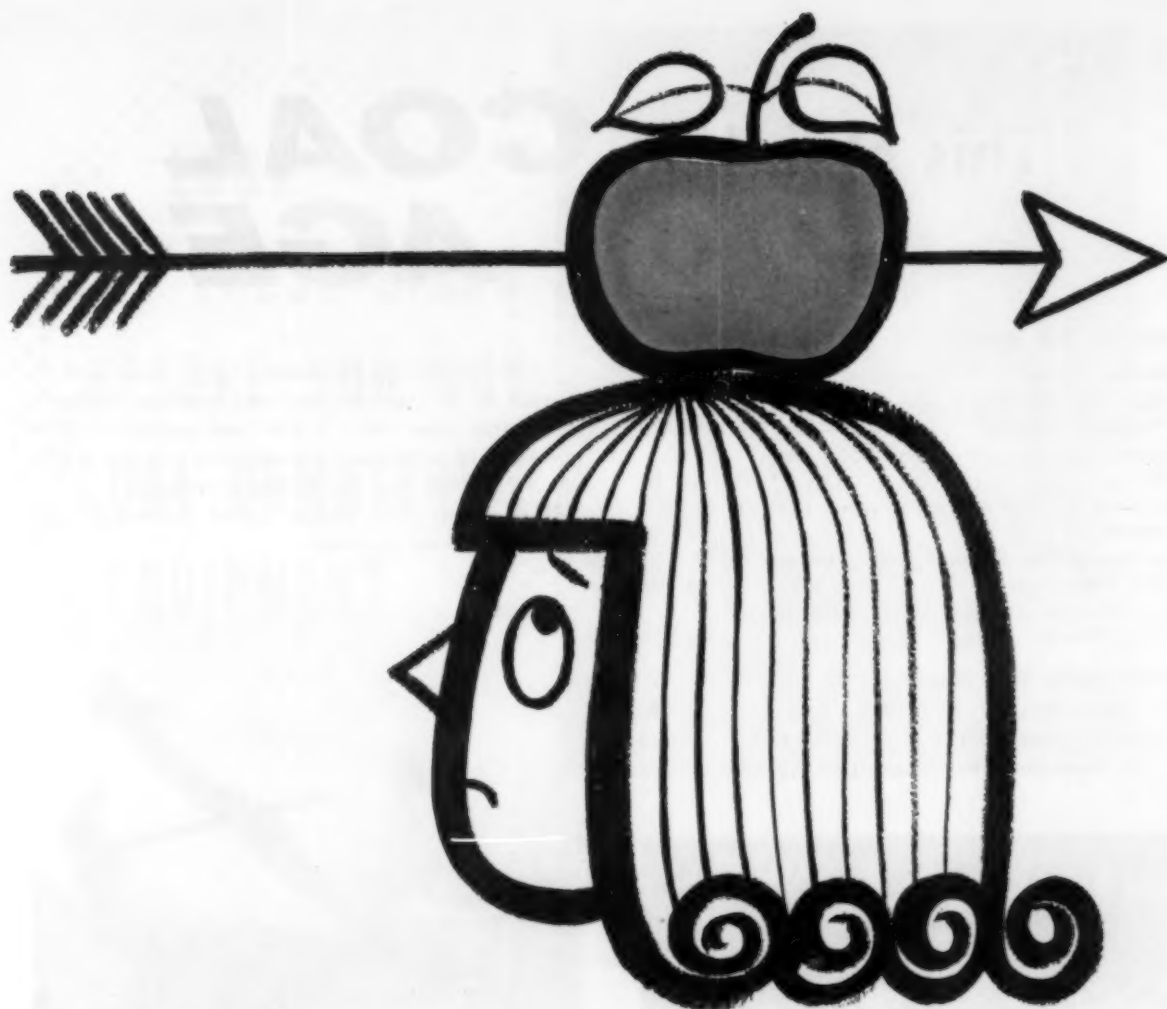
Efficient Thin-Seam Stripping

Serves Utility Market p 80

Only 68 men are required to mine, haul and prepare 4,000 tpd from a 26-in seam at Peabody Coal's Tebo mine near Calhoun, Mo. Close supervision of drilling and blasting, skillful operation of a 30-yd stripping shovel, and coal preparation with only four men play important roles in successful stripping of the Tebo seam. Ammonium-nitrate explosive with built-in primer simplifies charging of horizontal blast holes. An automatic car haul, operated from the loading point above the tracks, eliminates need for car dropper.

Extra—Mechanized handling of salt for freeze-proofing.

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► AC Mining

Cable for AC Underground—

Cable and Installation p 90

Thomas R. Weichel, Mining-Electrical Engineer, The Okonite Co., Passaic, N. J.

Installation and application of high-voltage and trailing cables should conform to state and federal regulations. ASA rules may be a guide when other regulations are not specific.

Steel-wire-armored cable protect against damage and provide additional strength for long suspensions.

Nonmetallic neoprene-armored high-voltage cable is suitable for all applications, easy to handle and works satisfactorily underground up to 15 kv.

Splicing and terminating is accomplished safely and easily with suitable coupling devices.

Standard 600-V portable cables can be used for secondary distribution and as trailing cables. They should be sectionalized wherever possible.

Problem—Getting better cable performance with high-speed reeling devices. Improvements in both machine and cable design is necessary.



► Maintenance

How Central-Shop Facilities and

Services Pay Off at Slab Fork Coal p 104

Centralizing main-shop work stabilizes overall maintenance cost and also, because of large volume of work handled, increases efficiency, provides additional repair and maintenance skills, simplifies and reduces inventory, and eliminates duplication of services and facilities. Designed to overhaul, repair and fabricate equipment for mines and preparation plants, the shop is divided into nine departments or work areas with the necessary space and equipment for the jobs performed. The central-shop crew handles over 95% of the work of this type for the various properties, including two preparation plants.

Savings—What and where they are.

This Month in **COAL**

ADDED EVIDENCE—Last month this column cited several reasons for the lag in bituminous recovery and suggested the second quarter may mark the turning point for a sustained breakthrough to higher production. While it is still too early to claim the fact, the following added evidence brings it closer to reality: (1) two of the biggest bituminous producers have noted that their 1959 tonnage is running substantially ahead of comparable 1958 periods; (2) more of steel's continued high output is reported going into current usage as customers show less concern about anticipating the possible July strike through inventory buildups; (3) total second-quarter carloadings are expected to exceed 1958 by 12.4%, with those of coal and coke alone moving up 7.3%. Perhaps NCA sets the tune, forecasting a jump from 104 to 113 million tons between the first and second quarters.

REASSURING—In view of bituminous' severe output drop in 1958 and early 1959, it is reassuring to note no abatement of interest by the investment community. Standard & Poor's latest analysis (March 19, 1959) says "production in the months ahead should be well above that a year earlier," adding that progressive earnings improvement are in the offing, especially for producers of coking coal. *The Value Line Investment Survey* (March 23, 1959) calls "a 49% expansion in the use of coal by electric utilities between 1958 and 1962-64" an "encouraging prospect for the coal business." *The Survey* also draws attention to the industry's great potential for strengthening its competitive position through increased use of more efficient equipment.

MASSIVE PUSH—In the Sept. 14 issue of *Life*, the Edison Electric Institute and major electrical manufacturers will team up in a 30-p ad on the All-Electric Medallion Home to promote electric heating, lighting, wiring, appliances and home modernization.

Electrical World, a McGraw-Hill publication, advises the ad will be the largest ever run in a general magazine. Announcement of the ad beefs up the *Coal Age* report (January, 1959, p 70) that the electrical industry is making a massive push to promote home heating by wire, thus opening new opportunities for coal to recover lost retail tonnage. Other giant campaigns announced in the past few months have included EEI's National Electric Living Program and Westinghouse Electric Corp.'s Total-Electric Home promotion.

WORTH WATCHING—During the past 3 yr or so, Glen Alden has been crowded out of anthracite's top spot in output, earnings and management performance by Philadelphia & Reading. Now, however, under the new leadership of H. W. Bradbury, things are popping fast at Glen Alden and pointing to solid resurgence. In 1958, for the first time in 6 yr, GA's coal division turned money-maker, converting the 1957 loss of \$1.8 million to a profit of \$1.4 million. Major surgery is taking place in expenses, and capital development, and a recent merger with widely diversified List Industries should pave the way to greater achievement.



NOW!
complete protection
without a frame ground wire!
lower maintenance cost... less down time!

JOY • *Lectronic Sentry**

Here at last is positive protection against ground faults and short circuits for all D. C. operated off-track mining machines and their trailing cables.

The JOY — ELECTRONIC SENTRY offers a degree of protection never before possible. An ever-present monitoring signal is interrupted when trouble occurs and an automatic circuit breaker acts instantaneously to remove power from the complete machine and trailing cable. There is no destructive arcing due to heavy fault currents as in the case of operation with a ground wire. There is no false sense of security as the Lectronic Sentry must fail safe!

*PAT. PENDING.

Accepted by U. S. Bureau of Mines for Use on Permissible Equipment.

The ELECTRONIC SENTRY prevents energizing equipment when a dangerous condition exists, whether it be a ground fault in the machine itself, a short circuit in the machine or its trailing cable, or a broken or open cable conductor — and it distinguishes between normal overloads and short circuits.

Because it can provide this positive safety *without a grounding conductor*, it permits the use of lower cost, 2-conductor cable — which means more cable in the same space for greater flexibility and distance of movement. Another plus bonus: reduced cable maintenance and less down time of equipment.

Write today for detailed information.

JOY

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1205 Macklind Ave., St. Louis, Mo.

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► Canadian Stripping

40:1 Ratio and Feldspar Jig

Highlight Avon Strip Progress.....p 110

Temperatures ranging from 95 above in summer to 40 below in winter, combined with an average 40:1 ratio for overburden to coal, mark operations of the Avon Coal Co., Ltd., in the Rothwell-Minto area of New Brunswick, Canada. Four pits and annual production of over 250,000 tons make Avon one of Canada's largest stripping operations. Three draglines and a shovel strip the overburden, which averages 45 ft, and loading of coal is accomplished by seven front-end machines. Expansion is continuing with a new dragline and drill, plus other facilities. Greater consumer satisfaction has been achieved by an air-operated jig plus a feldspar unit for $\frac{1}{4} \times 0$, supplemented by heat and mechanical drying and oil-treating.

Special at Avon—Emphasis on inspection and maintenance, in part a result of the 135-deg temperature variation.

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This Month in Mining Practice

CONVEYOR-TRAIN PARK&R—The date when the remotely controlled continuous machine, now known as "the electronic miner," will become a widely used unit has been moved appreciably closer by the signing of a joint development contract between a major coal company and a major manufacturer. One of the problems has been the necessary interruptions involved in adding and removing conveyor sections. The crawler-mounted "Helitrack" is now being developed as the answer, and will bring a new "Man-From-Mars" unit to coal.

Inevitable—Use of remotely controlled machines underground for perhaps the last step in automation of subterranean production.

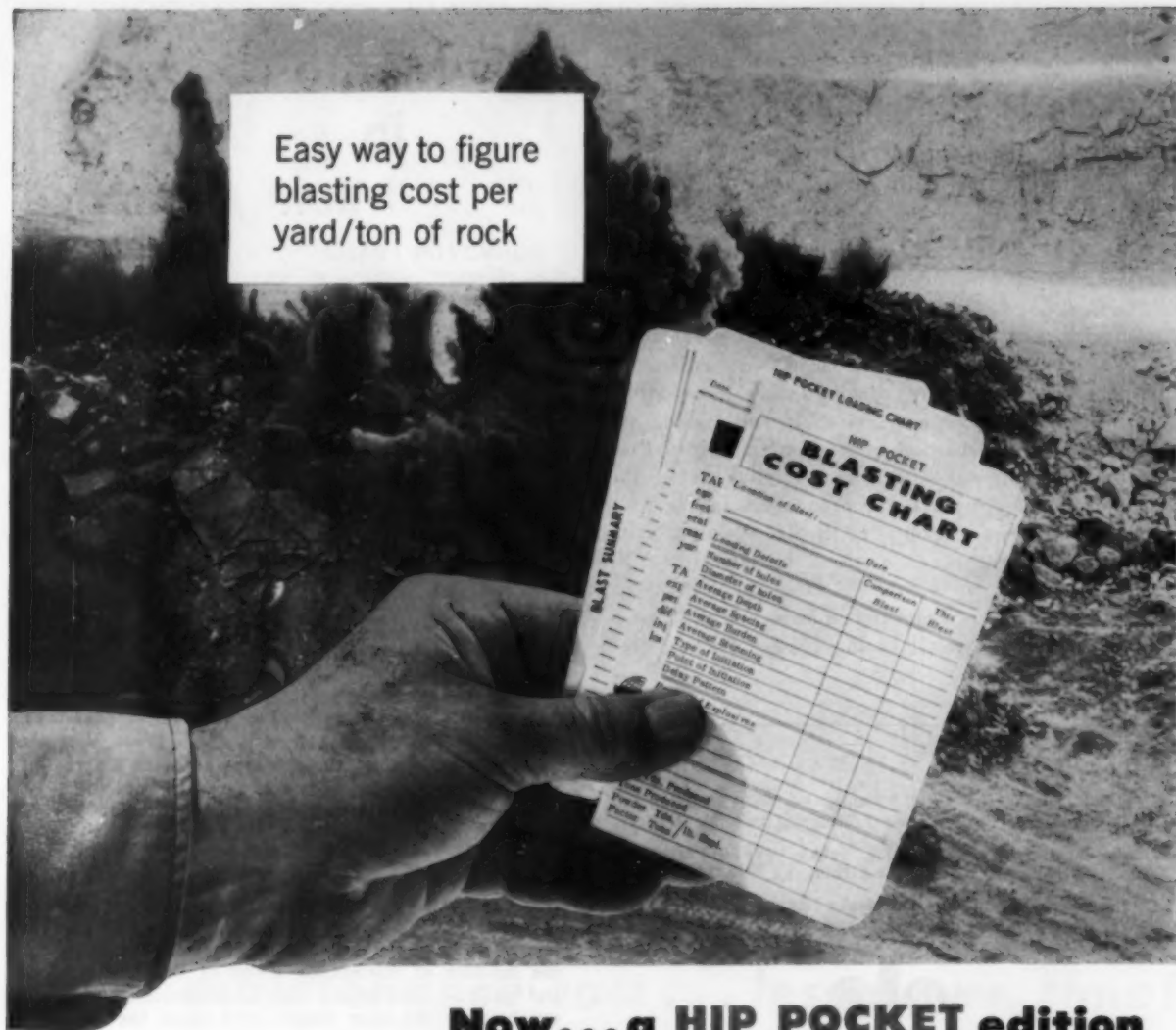
MORE REGULATION FOR STRIPPING?—The reappearance in many areas of newspaper features usually emphasizing the so-called destruction of land values, and usually followed by a rash of bills with objectives up to and including a flat prohibition of such mining, signals perhaps a renewal of pressures for tighter restrictions on stripping. West Virginia may well be one of the states where the degree of additional restriction may be threshed out in 1959. Those that step up their reclamation efforts now probably will not be ahead of the parade long.

NUCLEONIC TESTING—With the exception of sink-and-float, provided it was done in the proper type of unit, coal analysis and testing has always involved time lags of varying degrees. Now, through the medium of nucleonics, many of these delays can and will be eliminated. One such device, confidently expected in the near future, will show the moisture of coal in the car automatically. Instantaneous ash content is another possibility.

BOLTING BY SHOOTING—A rather old dream of installing bolts by shooting them into the roof may turn out to be not a dream at all if properly researched. On the basis that if you can think of something you can eventually work out a way to do it, it is perfectly feasible. Actually, the difficulties are considerable though they might be surmounted if worked on hard enough. Meantime, regular bolting continues to serve the operator well, and solidifying roof by cementing continues to show real promise.

"THE YEAR" IN MAINTENANCE—Reports of such developments as taking a magnetic-flux machine into the field to check machine parts on the ground on the one hand, and a drive in the engineering departments of manufacturers to build more resistance to wear and breakdown into their equipment on the other may result in 1959 or 1960 being termed, at some future date, "the year" in which real preventive maintenance was inaugurated. In any event, look for better machines off the factory floor and for better operating, inspection and preventive practices on the job, and perhaps not too far in the future a substantial cut in the present 40 to 50c per-ton cost of maintenance at many properties.

Easy way to figure
blasting cost per
yard/ton of rock



Now...a HIP POCKET edition of the Atlas BLASTING COST CHART

Here's a new 1959 Atlas Blasting Cost Chart that goes right out on the job with you—helps you record the cost data you need to protect your profits.

The original Blasting Cost Chart, with instruction book and Slide Rule, is being used successfully by hundreds of operators. Now, to make it more convenient, Atlas has added this "hip-pocket" edition. With it you can compare results from blast to blast to determine methods that pay off best. It helps you assemble quick cost facts on drilling, secondary breakage, digging, hauling, and crushing.

Your Atlas representative will be glad to show you how to use the new "hip-pocket" Cost Chart. He has a kit full of information that may help reduce your costs and protect your profits. Ask him for details, or write us direct.

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Ask your Atlas representative to show you the electric match demonstration . . . See why Atlas E. B. Caps lead the field in dependable performance.



The Coal Commentator

How Far . . . How Fast?

The combination wage boost and price cut that marked April 1 for the bituminous industry sharpens up the point of this question:

How far can the coal industry go in offsetting wage increases and any further price reductions . . . and how fast?

On the basis of today's productivity, the average labor cost of a ton of coal is around 45% of the mine price, give or take a few points. At mines with the latest equipment and methods and average conditions, outputs of 15 to 20 tpm are being achieved, meaning that labor becomes 25 to 35% of today's average value of around \$5 per ton.

The date when bituminous will reach 15 tpm as an industry average cannot be set today, but it is quite likely to be not later than 1965—and perhaps earlier. This means that coal still has elbow room if it is required to meet further cost increases, though it might be contended that it would be better to use at least part of this reserve to maintain low prices and thus strengthen competitive power.

In any event, the elbow room is available. Wise use will definitely redound to coal's benefit.

Boon to Man

Coal's benefits to mankind are many and various, in addition to its basic one of energy for heat and power. Latest is a powerful new painkiller recently disclosed by the federal government.

The new drug, which is not yet on sale to the public, is a coal-tar compound and as such is a new addition to a lengthening list of materials for internal, external and other uses. Fewer adverse effects than morphine and ten times the painkilling power are among the new product's advantages.

It won't mean millions of tons of new business for coal, but other research efforts could—pipeline gas and motor gasoline, to name but two of the more outstanding possibilities which could turn into probabilities in the future. Meantime, coal for heat and energy remains the major boon to mankind, though a man with an aching tooth might rank the painkiller first at that particular moment.

Salable Methane?

If you happened to be close to a pipeline and could offer it a fair volume of methane, you could probably get 10 to 15¢ a thousand minimum for the pure stuff. These conditions, as a matter of fact, are present in a number of mines and may be in more as new properties are opened.

If you are putting in 200,000 cfm and the methane in your main return is ¼%, you are discharging, at

the preceding prices, \$3 to \$4.50 worth of methane per hour. If that were the only consideration, there would be little justification for thinking about special drainage and collecting facilities. But where very high gas emissions are encountered, the problem, especially with the rapid advance characterizing the use of continuous miners, becomes a very real one of safety.

So serious is the situation at some properties that territories are first outlined by entries and then left to bleed. Drillholes from the entries and from the surface are other suggestions. Such systems would provide a relatively easy means of collecting the gas for sale—if volume and price were right.

It could happen here, as it has abroad, in the not-too-distant future.

More Contenders?

"A nuclear reactor designed specifically to produce low-pressure steam for the process industries at a cost competitive with that of conventional fuels has been developed by the H. K. Ferguson Co., of Cleveland, in cooperation with the nuclear division of The Martin Co."

So reads the opening paragraph of a story from McGraw-Hill's Cleveland News Bureau, followed closely, on April 7, by news of the Los Alamos scheme for converting nuclear heat directly to electricity. Details in the news section. The next question for coal is: "Will these really constitute a competitive threat?"

Only time will provide the answer. Until it is provided, perhaps the fossil fuels—particularly coal—can assume that, on the basis of past experience, the road to real competition will be longer rather than shorter.

More and More

Northern Pike Elementary, the first all-electric school building in Western Pennsylvania, was featured in the leadoff article in the *Duquesne Light News* of April. Almost the same day your commentator also received an announcement from the Western Maryland and G. E. detailing the success of a new car-thawing installation featuring quartz infrared lamps.

The Northern Pike payoff included a \$60,000 reduction in the cost of school. Operating its heating equipment (24,160 sq ft, 350 children) will average \$5,200 a year. A thawing rate of six cars per hour even in zero temperatures is the payoff for Western Maryland.

Versatile and economical, electric heating looms larger and larger as a load-builder for the utilities and coal.

Special steels produce super savings in



USS "T-1" Steel bucket sets performance records. This 15-cu.-yd. dragline bucket was rebuilt by the Hart and Hart Coal Company, Providence, Kentucky. They used $\frac{5}{8}$ " plates of USS "T-1" Steel for the bottom, sides and end in an effort to get longer service, and to eliminate expensive, time-consuming repairs.

The "T-1" Steel bucket now has had about five months of round-the-clock service in rock and shale and shows no signs of cracks or excessive wear—a record unequalled by any other bucket in their experience! USS "T-1" Steel's great strength, (100,000 psi min. yield) plus toughness, weldability and high resistance to impact abrasion, make it the ideal steel for mining equipment. Photo shows Mr. George Hart, co-owner of the coal company and Mr. Jesse O'Williams, his assistant.

ngsn mining equipment

High Strength • Alloy • Stainless

Today's mining equipment will take more rough and tumble treatment, handle bigger loads and last longer than rigs built just a few years ago. Why? Because designers are using the toughest, strongest steels they can get to put more muscle into their products.

This means a better profit picture for you. Every pound of dead weight cut out of mobile equipment means that much added payload. Lighter equipment travels faster—earns more profits. More rugged rigs stay out of the repair shop and on the job. These are a few of the plus values you get from the new extra-strong, super-tough steels.

Here are the USS Steels that do more

USS MAN-TEN Brand—High strength with abrasion resistance and economy. (Minimum yield point 50,000 psi up to $\frac{1}{4}$ " thick incl.)

USS COR-TEN Brand—High strength with superior atmospheric corrosion resistance. (Minimum yield point 50,000 psi up to $\frac{1}{4}$ " thick incl.)

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USS "T-1" Brand—Super strength with impact abrasion resistance, toughness and weldability. (Minimum yield strength 100,000 psi or furnished to 321 min. Brinell hardness.)

USS STAINLESS—High resistance to corrosion, temperature, pressure, and abrasion.

Each of these steels has a combination of properties that makes it best for specific applications. Our metallurgists will be glad to help you choose the best steels for your job. Call our nearest Sales Office or write United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

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United States Steel Supply—Steel Service Centers
United States Steel Export Company

United States Steel



High Strength Steel rips through rock at 30 degrees below zero. The dozers, trucks and shovels used at this strip mine in Alaska have vital parts made from High Strength Steels. When it's 30 degrees below zero, and you have to rip through rock, field failures are frequent, but not with this equipment made from High Strength Steel.

The stronger, tougher USS Steels used for applications like this are USS MAN-TEN, TRI-TEN, COR-TEN brands with minimum yield points of 50,000 psi and USS "T-1" Constructional Alloy Steel furnished to 321 min. BHN or to 100,000 psi min. yield strength.



Stainless Steel coal screens outlast other metals 4 to 1. Tons of coal grind across this demanding screen every day. It gives excellent results because it's made from USS Stainless Steel Wire. Stainless Steel resists corrosion caused by wet coal. It keeps a smooth surface that lets coal slide easily, avoiding production-stopping build-ups. If you want longer service from your equipment—screens, flumes, chutes, shakers, vibrators, and jigs—specify USS Stainless Steel.

DORR-OLIVER *equipment* *for fine coal cleaning circuit at giant*

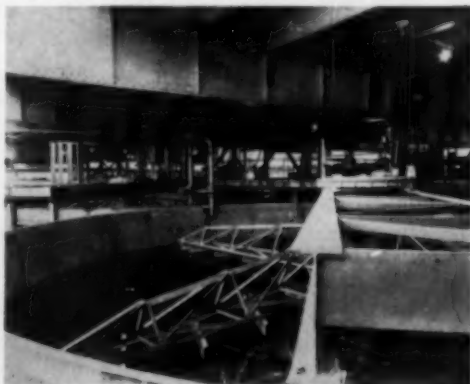
For sheer size and unique features of construction alone, U.S. Steel's preparation plant at Gary, W. Va., is one of the most interesting coal properties in operation today.

Dorr-Oliver equipment in the fine coal cleaning circuit plays an important role in the overall successful operation of this plant. Of primary significance is the Dorcco FluoSolids coal drying system. Other major Dorr-Oliver equipment units contributing to efficient operation include eight 44' diameter bowl x 16' wide rake Dorcco type HX Bowl Desilters, two 120' diameter type SS Thickeners and two heavy duty type W #8 Diaphragm Pumps. Essential features of plant operation are given in photo captions at right.

Now, perhaps your operation does not call for equipment of this magnitude. However, regardless of plant size, Dorr-Oliver equipment can point the way to more efficient, economical operation. For more information just drop a line to Dorr-Oliver Incorporated, Stamford, Connecticut.

OVERALL VIEW OF USS fine coal preparation plant at Gary, W. Va. Note the 120' diameter Thickener tanks installed on roof. Plant is one of largest—if not the largest—of its type in the world.

DESILTOR FLOOR. Eight Dorcco Bowl Desilters prepare table feed by desliming 750 tons per hour of $\frac{1}{4}$ " x 0 coal at approximately 100 mesh. Efficiency of desilting operation contributes to greater effectiveness of table plant.



DESILTOR RECIPROCATING RAKE ARMS convey oversize fraction from Desilters up drainage deck to elevated point of discharge. Minimum fines permit high degree of dewatering of table concentrates, thereby reducing load on thermal drying plant.



DORR-OLIVER
INCORPORATED
WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT
STAMFORD • CONNECTICUT • U. S. A.

Dorcco and FluoSolids — T.M. Reg. U.S. Pat. Off.

new **USS** preparation plant



ROOF-TOP THICKENERS handle minus 100-mesh Desilter overflow, which is thickened by addition of starch. Thickener overflow is returned to plant as process water.

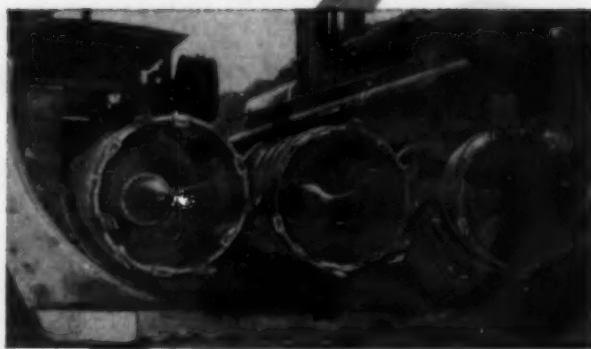


DRYING PLANT comprises two 14' I.D. Dorcco FluoSolids Dryers plus auxiliary equipment. Plant was designed to remove 36 tph of water from 600 tph of $\frac{1}{4}$ " x 0 coal. Actual operation has nearly doubled this figure of water removal.

COMPTON

"Triple Head"

COAL AUGER



SMASHES THE THIN SEAM BARRIER!

RECOVERS LOST TONNAGE!

AS THIN AS 24 INCHES

AS DEEP AS 200 FEET

They said it couldn't be done—all-out coal recovery from the thin seam—economically and profitably!

Then the Compton "Triple Head" Coal Auger smashed the barrier by supplying the stopper to the profits that got away—those tons and tons of coal in the thin seam, way back under.

The Compton "Triple Head" Coal Auger moves along the working face of the highwall! Its three cutting heads operate in unison, bor-

ing as deep as 200 feet, augering up to 58 tons of clean, saleable coal from a 24" seam in an hour! And the Compton "Triple Head" Coal Auger assures maximum recovery too, drilling within $4\frac{3}{4}$ " of the bottom of the cutting heads, regardless of size!

Seam thickness makes no difference to the Compton "Triple Head" Coal Auger! It drills a double row of over-lapping holes as easily as a single row.

Why not phone for a Compton auger mining specialist today? He will analyze your property and determine if it calls for a "Triple," "Double" or "Single" Head Coal Auger!

Compton, Inc.
REGISTERED U.S. PATENT OFFICE

CLARKSBURG, WEST VIRGINIA

WHEN LOOKING FOR AUGERS — LOOK TO COMPTON



Makes a cut 14'7" wide

All the benefits of fast, efficient, continuous mining... in seams as low as 28 inches



JEFFREY 86-A COLMOL



Low maintenance

Jeffrey 86-A "Colmol" is only 25¼-inches high... mines seams as low as 28 inches... makes a cut 14-foot 7-inches wide... gives good cleanup and smooth bottom.

Specially designed cutting and gathering chain carries coal to the center of Colmol, then up and onto the swinging discharge conveyor. It smooths off the cusps, even when the breaker-arm head is raised 8 inches for maximum mining height.

This powerful, compact Colmol advances with minimum maneuvering. Coal is broken from the face... not ripped or ground off. You get good overall screen consist, greater speed and efficiency. Colmol withstands the most severe mining conditions, operates with little noise or vibration.

All adjustments are hydraulic, can be made instantly and accurately. Easily accessible parts simplify adjustment and servicing. Safety features provide extra protection for both personnel and machine.

For low seams... or seams up to 8 feet high efficient, easy-going Jeffrey Colmols step up your production rate, cut operating and maintenance costs. Write for full details. The Jeffrey Manufacturing Company, 912 North Fourth Street, Columbus 16, Ohio.



JEFFREY

MINING • CONVEYING • PROCESSING EQUIPMENT...TRANSMISSION MACHINERY...CONTRACT MANUFACTURING



*When you're talking
about a \$162,000
dipper shovel, you've got to
talk about
the best
rope for it*



Talking about or working with, the same thing applies. Anything below Royal Blue's performance level is simply unrealistic. Like looking for a cut-price brain surgeon.

Even at \$162,000, the cost of wire rope is important. That's why so-so ropes can cost you more in the long run, because so-so ropes are *short run*. Royal Blue, on the other hand, is built by America's oldest manufacturer of wire rope to last, to do the job without a whimper. Here's why.

Royal Blue is made from the toughest rope wire ever made—Type 1105—extra high-strength improved plow steel. This pedigree gives to the rope qualities that you can't find in any other rope: exceptional resistance to shock, abrasion, fatigue and impact. Add to these a flexibility that age cannot wither nor hustling fade and you've got a collection of characteristics that make Royal Blue the strongest rope you've ever used.

A \$162,000 Dipper Shovel deserves the best and your Roebling Distributor has it... Royal Blue. Any inquiries about this high-born rope will be answered immediately by Wire Rope Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

ROEBLING

Branch Offices in Principal Cities • Subsidiary of The Colorado Fuel and Iron Corporation

Metallurgical Memo from General Electric



How Industry's "metallic vitamins" cut coal mining costs

Metallurgical Products Department reports
on Carboloy® cemented carbides . . . and on two
better mining bits that contribute importantly
to lower cost coal mining

The very introduction of Carboloy cemented carbides—up to 50 times longer wearing than steel—reacted like a vitamin on coal production. But it remained for General Electric's coal mining *specialists* to come up with the bit designs that could really use them to maximum advantage.

The Carboloy CCS-2 machine bit, for example, *encloses the carbide tip in steel* to get maximum value from Carboloy cemented carbide's great compressive strength. It's one reason why the CCS-2 takes abuse ruinous to

other bits. Another example is the Carboloy PTV style roof drill bit. Advanced metallurgical and manufacturing techniques have made possible the use of the hardest, most wear resistant grade of carbide on any standard mining tool. Result: more footage, lower bit costs.

Be sure *you* get the most advanced mining bits—bits that deliver more for your tool dollar—by specifying Carboloy mining tools. Your *local* Authorized Carboloy Mining Tool Distributor carries the complete line. Metallurgical Products Department of General Electric Company, 11120 E. 8 Mile Blvd., Detroit 32, Michigan.

CARBOLLOY
CEMENTED CARBIDES

METALLURGICAL PRODUCTS DEPARTMENT

GENERAL  ELECTRIC

CARBOLLOY® CEMENTED CARBIDES • MAN-MADE DIAMONDS • MAGNETIC MATERIALS • THERMISTORS • THYRITE® • VACUUM-MELTED ALLOYS



**A STAR OF A SCREEN...
AND IT DRAINS
LIKE A DREAM!**

Hendrick Wedge Slot is made with small openings to assure fine screening . . . the kind that keeps coal quality high. Yet, the special Wedge Slot construction affords far greater draining and screening capacity than with any other screen.

Here's another big plus: Wedge Slot's profile bars are "precision shaped" to maintain uniform width of slot openings the entire length of the screen as wear progresses.

To find out more about these special features of Hendrick Wedge Slot, write today. We'll be glad to provide details about the Wedge Slot Screen that's best suited to provide long life under your specific operating conditions.

H E N D R I C K
MANUFACTURING COMPANY

41 DUNDAFF STREET, CARBONDALE, PA.

Perforated Metal • Perforated Metal Screens • Wedge-Slot Screens • Hendrick Wedge Wire Screens • Architectural Grilles • Milco Open Steel Flooring — Shur-Site Treads • Armorgrids • Hydro Dehazers • Distillation Column Internals

NEW from **LONG...**

**Low Height, high performance 80 HP loader
for AC Mining**



The LONG 188-E

Makes Maximum Use of AC design advantages

Unlike DC motors, AC types do not develop maximum torque when starting—also high inrush currents are characteristic with AC motors starting loaded. In the LONG 188-E, a single 80 HP motor powers the machine through clutches with full pull-out torque available. This single motor is started light and runs continuously during operation, with all machine functions controlled by a single bank of finger-tip control valves. The result—inrush and torque problems characteristic of multi-motored designs are eliminated. In addition to the 80 HP motor, one circuit breaker, one size 4 contactor, and one pushbutton complete the electrical circuit of this powerful loader.

Offers greater simplicity—top performance

Only LONG manufactures single motor gathering arm loaders with full independent crawler control. This highly successful feature permits the machine to turn in its own length and, combined with extra

length crawlers, extra power and high speed gives the 188-E maximum maneuverability.

Provides high-capacity operation

The 188-E, with its greater power, stepped-up speed and clutch capacity, will maintain loading rates of 8-10 tons per minute in heavy going.

Costs less initially—less to maintain

With no more than half the moving parts of most multi-motored designs, the 188-E can be depended on for lowest possible maintenance costs, plus economies in spare parts inventory. Simpler design is reflected in important savings in first cost also.

The LONG 188-E is available in overall heights as low as 25¾". Machines specially designed for rock and other minerals also available.

Write for details or a demonstration.

The

LONG

Oak Hill, W. Va.

Company

New 19 and 27

- 375 and 250 hp engines
- 30% less body weight
- 14% faster haul speeds



NEW "95" Payhauler

STRUCK: 18 cu. yd. PAYLOAD: 27 tons

The new Model "95" Payhauler moves payloads faster and for less money than any 27-ton rear dump with cycle-speeding 375 hp under the hood and elimination of all free-loading body weight.

Here's why the new "95" earns more for you:

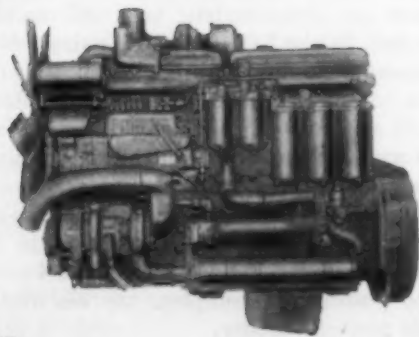
New 375 hp turbo-charged International diesel engine plus rugged yet tons-lighter corrugated body gives best power-to-weight ratio of all similar rigs, helps move payloads 14% faster on all grades both up and down.

Speeds to match all loads and roads with choice of torque-converter with powershift, or 9-speed, constant-mesh transmission. Haul speeds to 38 mph.

Faster reversing, up to 7.1 mph with gear-drive model speeds spotting or positioning for dumping.

Load-speeding safety and unequalled operating ease with power steering, torqmatic braking, and full-sweep vision.

11-second dumping with exclusive inverted hoist action and industry-topping snubber mechanism.



Great new 375 hp and 250 engines

Both Payhauler models have a big power plus under the hood. The "95" is powered by this all-new International DT-817 375 hp turbo-charged diesel while the "65" is powered by the same basic engine, the naturally aspirated D-817, that develops 250 dependable low cost hp. Both are heavy-duty, high-speed, direct-start, 4-cycle, 6-cylinder models thoroughly proved in six years of development and testing. Both are products of 26 years of International experience building heavy-duty diesels for rugged applications.

27-ton Payhauler® models

NEW "65" Payhauler STRUCK: 12.5 cu. yd. PAYLOAD: 19 tons

The new Model "65" Payhauler sets new performance standards as the only 19-ton off-highway truck on the market...new 250 hp naturally aspirated International diesel engine...best power-to-weight ratio...new rock-

ribbed body with tons less deadweight...10-speed constant-mesh transmission that helps bonus power speed more paydirt...speeds to 36.37 mph...and cab comfort and safety features that let the operator keep his mind on his work rather than on truck controls.

For a refreshing experience in what's new in rear dumps, invite your International Construction Equipment Distributor to bring either Payhauler to your job for a show-down demonstration against your present haulers.



Biggest body improvement in 25 years

International corrugated quarry and standard bodies are the industry's biggest body improvement in 25 years. Corrugated panels—with triple the strength of conventional flat steel plates—cut body weight 30% in sides, front, canopy, and subfloor at no reduction in strength or protection to operators. Loads being dropped onto the body wear floor are cushioned by up to 26 corrugations in the sub-floor. Patent applied for heated bodies have no cold spots, create no damaging exhaust back pressure. Benefit: haul payloads without hauling up to 5000 pounds of free-loading steel each cycle.



**International[®]
Construction
Equipment**

International Harvester Co., 180 North Michigan Avenue

A COMPLETE POWER PACKAGE: Crawler and Wheel Tractors... Self-Propelled Scrapers and Bottom Dump Wagons... Crawler and Rubber-Tired Loaders... Off-Highway Haulers... Diesel and Carbureted Engines... Motor Trucks... Farm Tractors and Equipment.



Gulf makes things run better with new lubricant for modern

NEW GULF MINING

Now you can get more tonnage between overhauls from your continuous miners and other key equipment, with a new heavy duty lubricant—Gulf Mining Lubricant H.D.

This versatile lubricant is a semi-fluid, multi-purpose grease that meets every lubrication need at the face, and therefore simplifies application, storage and handling. You can apply it by pouring or with a grease gun.

New Gulf Mining Lubricant H.D. is fluid enough not to channel in a gear case. Yet it has

body enough to prevent excessive leakage from drive assemblies operating at high temperatures. In fact, it has "controlled leakage"—bleeds just enough to keep coal dust and other foreign matter from entering gear cases and bearings.

Gulf Mining Lubricant H.D. has high resistance to water, heat and extreme pressures. It inhibits rust and corrosion.

Proved effective in service. New Gulf Mining Lubricant H.D. has been tested for over a



Every requirement for grease at the face can be handled quickly and effectively with new Gulf Mining Lubricant H.D. Use it to lubricate your continuous miners, automatic loaders, cutting machines—all your heavy duty equipment.

mining equipment...

LUBRICANT H.D.

year at coal mines in Pennsylvania and West Virginia. It lubricates effectively under the pressures, shocks and high temperatures of modern mechanized mining.

Available now in convenient 35-lb. pails and 120-lb. drums.

Your mine can save time and reduce maintenance costs with new Gulf Mining Lubricant H.D. Try it. You'll see more proof that Gulf makes things run better! Call your nearest Gulf office, or mail coupon for booklet.

GULF

GULF OIL CORPORATION

Dept. DM, Gulf Bldg., Pittsburgh 30, Pa.

Send booklet on new Gulf Mining Lubricant H.D.

Name

Title

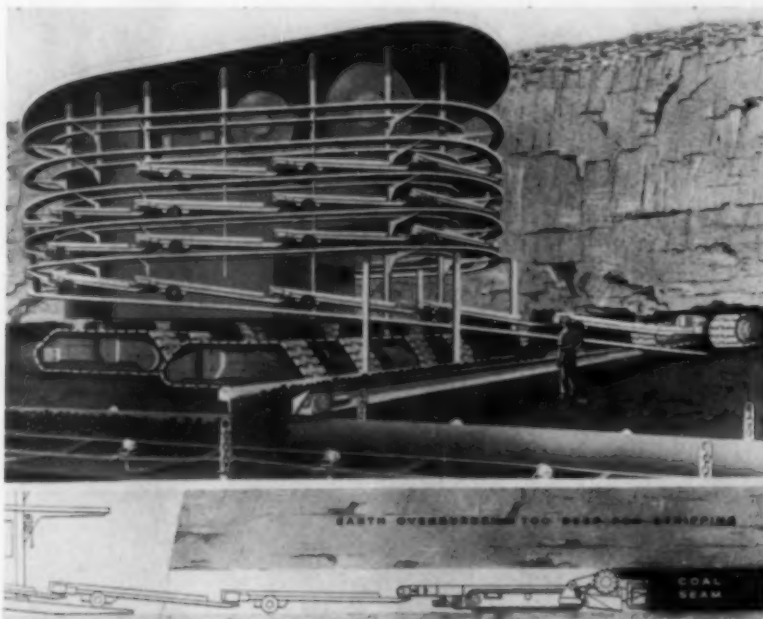
Company

Address

City Zone State

CA-9388

News Roundup



FROM MARS? No, it's a new electronic mining machine soon to be used by Peabody Coal Co. Circular "parking lot" holds a 1,000-ft long train of conveyors.



OPERATOR gets signals from miner . . . controls its action with push buttons.

Peabody Coal Co. and Joy Mfg. Co. work closely to speed completion of a new push-button miner for deep coal.

Electronic Miner May Open New Doors to Coal

AT A TIME everyone is talking about rockets and missiles, when such stirring wordage as "Discoverer," nose cones and polar orbits spill across the pages of our newspapers challenging the imagination, Peabody Coal Co. is quietly planning to put into operation some time this year a "revolutionary" new push-button coal mining machine.

Although this electronic miner, being developed by Joy with Peabody's co-operation, doesn't boast a rocket engine and is not likely to orbit, the coal concern believes the new machine will touch off a sort of coal "space age," a new era of "highwall mining."

Values—Designed for recovery of coal too deep for stripping and which cannot be mined economically with present equipment, the system enables one man to mine coal underground from a single electronic control center outside. Roof support and underground ventilation can thereby be eliminated. Penetration of a coal face about 10 ft wide and 4 ft high to a depth of 1,000 ft at a rate up to 3 fpm is possible.

Construction—Three major units comprise the new machine. These are: a launching platform; a conveyor transport system; and a mining machine.

1. Launching platform. This is a flat-sided tubular structure about 40 ft high. It is mounted on large crawler tracks to permit movement along the highwall. An inclined oval roadway called a "Heli-track" surrounds the platform to provide

storage for a 1,000-ft long train of portable conveyors. Reels for the power cables needed are attached to the Heli-track, which also supports the control station as well as the chain conveyor that transfers the coal to the main belt conveyor.

2. Conveyor transport. A train of permanently-connected self-propelled chain conveyors transports coal from underground to the surface. As the machine advances into the mine it pulls the conveyor train after it, then pushes the conveyors back out of the hole when retracting.

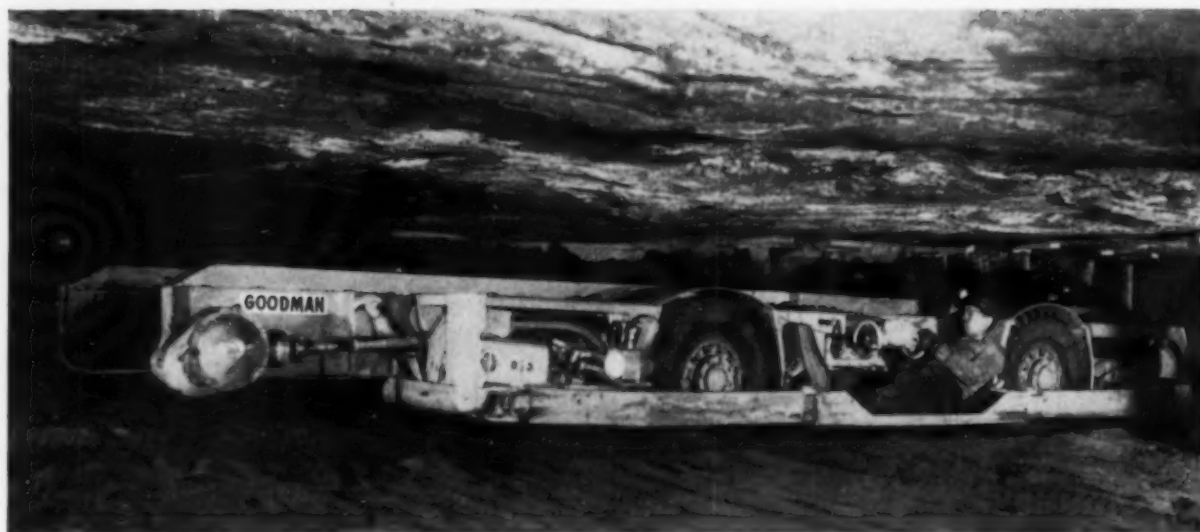
These conveyors, extremely wide, catch material from minor roof falls, carrying it to the surface, thus eliminating the need for men to go underground to clean up the floor.

3. Mining machine. Four overlapping cutter heads mine the coal. A rotary cutter across the top of the machine, directly behind the cutter heads, removes roof cusps left between the holes. Paddles on the two outer cutter heads direct the coal into a chain conveyor

In This Section

People in Coal	p 32
Coal Abroad	p 38
Current Coal Patents	p 42
Preparation Facilities	p 48
Equipment Approvals	p 48
Coming Meetings	p 50
Mines and Companies	p 50
Utilization	p 52

Low and wide, with Big Car performance

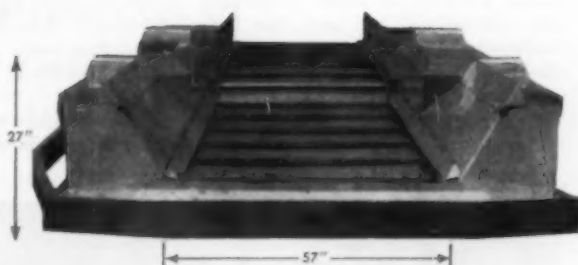


New Goodman type 870-20 low vein shuttle car

This low, wide car combines a big payload and ease of handling with all the structural strength expected only in big cars. Its capacity means fewer car changes per cut, lower elapsed loading time, more production per shift. Four-wheel power steering, 4-wheel power brakes, and 4-wheel drive provide ease of handling . . . reduce operator fatigue . . . promote safety.

As for strength—wheel units, conveyor chain, gear reducers and electrical control parts are the same as found in big cars, some even interchangeable. Frame and side plates are welded in a rigid one-piece unit reinforced with heavy cross-members. You don't have to worry about cracks or bends under severe conditions.

Make your low coal operation pay off. Team the big car performance and strength of the 870-20 (DC or AC) with the new Goodman 964 low vein loader. Get the full story from your Goodman sales engineer.



Low—27" height.
Wide—57" wide conveyor
3 1/2 to 4 ton capacity

GOODMAN
MANUFACTURING COMPANY

Halsted Street and 48th Place, Chicago 9, Illinois

CUTTING MACHINES • CONVEYORS • LOADERS
SHUTTLE CARS • LOCOMOTIVES • CONTINUOUS MINERS

Use Genuine Goodman Replacement Parts

News Roundup (Continued)

that carries it to the rear of the machine. The entire front of the machine is shrouded to force all of the cut coal into this conveyor.

The machine is steered horizontally by a pair of guide shoes on the front of the crawler tracks. The front end of the machine is pivoted for up and down motion to provide vertical steering through action of a hydraulic cylinder.

Electronics the Key—The control system on the new miner is a product of modern electronics. Sensing devices on the machine report its actions to the operator through electrical signals shown on an oscilloscope screen at the control center. The operator then electronically guides the machine to follow the coal seam by operating push buttons and levers.

Peabody's Plans—Although Peabody has indicated that the machine is now in its final stages of refinement, it has not indicated where or when it will put it into operation on a mass-producing basis. It has said, however, that it believes the new mining system will prove highly profitable in recovering deep coal that could otherwise be produced only by more-costly underground mining methods.

Nuclear Steam

A nuclear reactor designed specifically to produce low-pressure steam for the process industries at a cost competitive with conventional fuel costs has been developed by the H. K. Ferguson Co. of Cleveland in cooperation with the Nuclear Div. of the Martin Co.

The reactor, for which capital costs are estimated at \$2,500,000, reportedly

can produce 150,000 lb of saturated steam an hour at a working pressure of 150 psi. When operated at full load for 8,000 hr a year it will produce steam at a cost of 70¢ per million Btu, according to Ferguson which believes this to be competitive with fossil fuels in any area more than 300 mi from large bituminous coal deposits or not in the vicinity of oil or gas production areas.

The company points out that for every pound of fossil fuel burned in this country to generate electricity, 4 lb are burned to generate heat, but that so far very little effort has been made to develop a nuclear plant to produce heat as its end product, which is what the Ferguson-Martin reactor does.

The two companies have been working closely to design an integrated system of this type for the commercial market. Martin designed the reactor, the core and the primary loop and has specified the characteristics of the auxiliary systems. Ferguson designed the auxiliary systems and the containments.

Safety Award

Coal Age has been voted the National Safety Council's Public Interest Award for 1958.

The award is made each year to public-information media for exceptional service to safety. Howard Pyle, president of the safety group, reported that "a study of these 1958 awards shows the tremendous contribution of mass-communication media to the sharp reduction in the number of accidental deaths last year."

Mr. Pyle told *Coal Age* that the award which is non-competitive is designed to

allow the Council to express in tangible form its appreciation for exceptional service to safety.

Turbine Research

The Locomotive Development Committee of Bituminous Coal Research, Inc., has loaned a large coal-fired gas turbine valued at over \$1 million to the Bureau of Mines.

The 4,200-hp turbine installation, a product of 12 yr of research, has been used to supply data for a commercial model being designed to power locomotives.

The Bureau of Mines plans to use the machine in cooperative research with industry to determine changes which might qualify this type of equipment for use in stationary electric powerplants. Another application reported under consideration is the generation of power in arid regions.

Acquisition

Philadelphia & Reading Corp., a major producer of anthracite, has announced the acquisition of Blue Ridge Mfg., Inc., Imperial Shirt Co., Marlboro Shirt Co., Boys Tone Shirt Co. and other components of the Blue Ridge and S. Rosenbloom groups, manufacturers of work clothes for men and utility, play clothing and styled sportswear for women and children.

Purchase price is estimated to be about 175,000 shares of P&R stock and \$7 million in cash. Howard A. Newman, president of the firm, said the newly acquired earning power will more than compensate for the continuing decline in earnings of Philadelphia & Reading Corp.'s anthracite coal subsidiary . . . with excellent continuing management, these companies promise to make a growing contribution to Philadelphia & Reading Corp.'s earning power."

Mines, Companies

Koehler, N. M., will be the site of greatly increased coal operations by Kaiser Steel Co., according to reports.

Kaiser has indicated that it will open a new mine in the area because steel production at its Montana, Calif., mills requires more coal than is presently available from its fire-damaged Koehler operation. The new mine, which would be in a block of several million tons of

(Continued on p 50)



NEW HOME OFFICE of Pittsburgh & Midway Coal Mining Co. in Pittsburg, Kan., could easily pass for a beautiful residential home. The office, built under the supervision of the firm's engineering department, will be known as the P&M building. It is of Williamsburg architecture and features a formal garden.



USER SATISFACTION



Maintaining steady production at Ayrshire Collieries Corp. Harmattan Mine

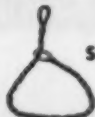
Stripping 80' or more of overburden to reach the coal seam is a rugged job at Ayrshire's Harmattan Mine near Danville, Ill. Two Bucyrus-Erie walking draglines with 25 yd. and 30 yd. buckets are handling the job. Both rigs are equipped with Yellow Strand Wire Rope—including 2" twin hoist lines, right and left lang lay 2½" drags and 1½" dump lines. At last report, Yellow Strand Wire Rope was giving excellent yardage, and was still going strong. LONG LIFE . . . LOW OPERATING COST . . . are the reasons for this Yellow Strand preference. To take advantage of this extra value, call your Yellow Strand

Wire Rope distributor today!
Broderick & Bascom Rope Co., 4203 Union Blvd., St. Louis 15, Mo.

Yellow Strand®



WIRE ROPE



SLINGS



CLIPS

Hauls a lot for a little ! This Dodge D500 has a big appetite for work—a small appetite for gasoline. And see how this thrifty, versatile worker can be matched to your *specific* job: Choice of four engines, from 125 to 210 hp. . . . 4- or 5-speed synchromesh transmission, or 6-speed Torqmatic . . . 3 front spring capacities, up to 2,200 lbs. . . . 3 rear spring capacities, up to 8,000 lbs. . . . single or 2-speed axle.

Your Dodge dealer will be glad to show you how this wide choice of components gives you a truck that is "Job-Rated" for your specific job. He'll also show you the driver-adjustable hand brake, hydraulically actuated clutch, electric windshield wipers, and all the other quality truck features that are yours at *no extra cost* with Dodge. See him soon—discover why . . .

today,
it's real smart
to choose **Dodge**
Trucks

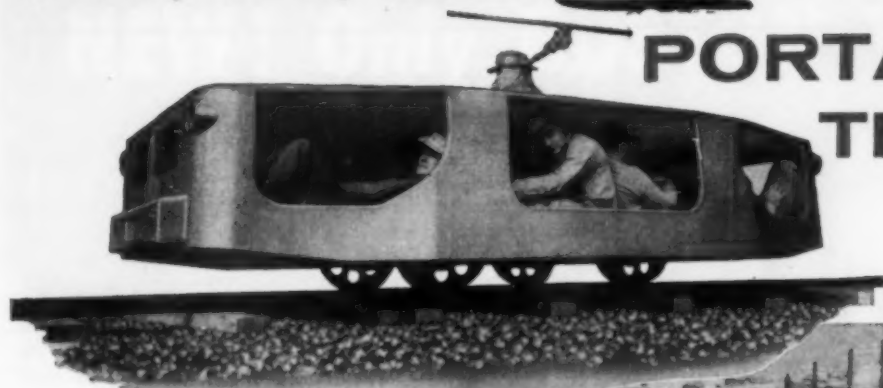


Dome-shaped combustion chambers like this deliver maximum power on low-cost regular gas. They help prevent harmful carbon deposits, too, cutting down the need for overhauls. And, of course, these technically advanced V-8 truck engines have famous Dodge dependability through and through, for years of economical service.

You, too, can reduce

PORTAL

TIME up to
50%!

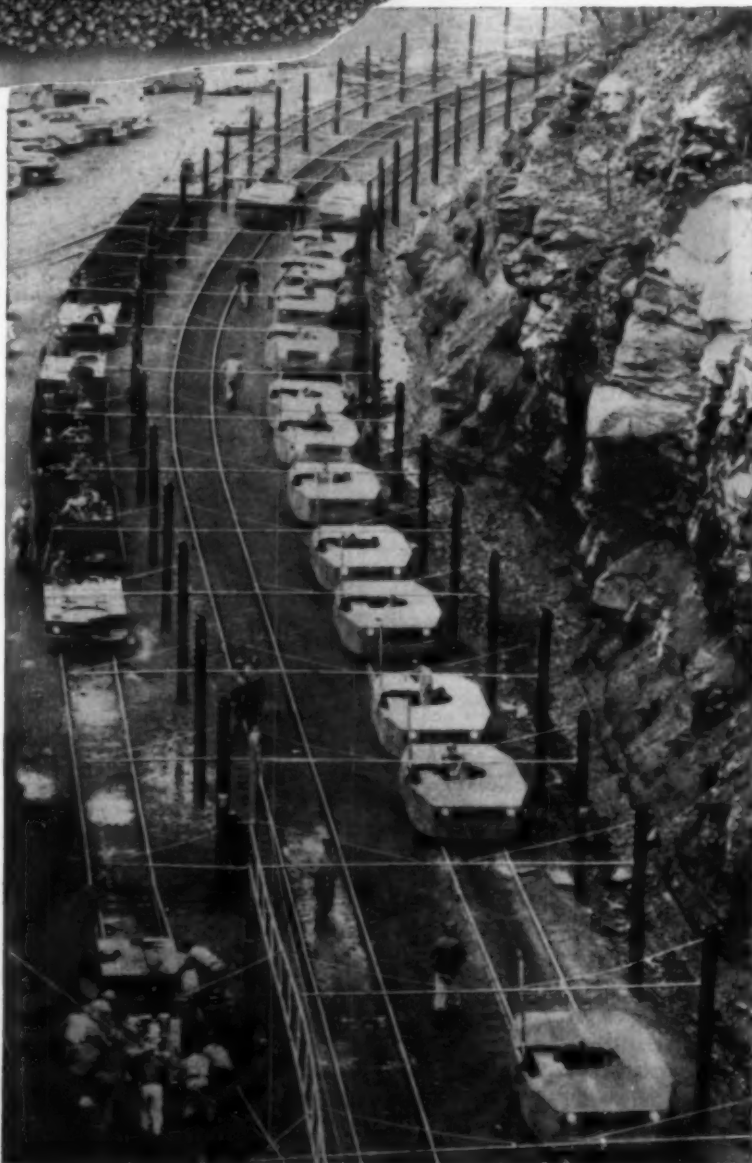


TJ5 Mine Portal Bus, "Low Type"

Lee-Norse Self-Propelled MINE PORTAL BUS

Factual performance records prove that the Lee-Norse Mine Portal Bus can effect up to 50% savings in portal time . . . savings that result in more man hours at the section face . . . increased tonnage at a reduction in overall cost per ton.

Built in low and high types to suit your haulage road, the Mine Portal Bus features complete safety—two separate braking systems . . . split-roof design that allows operator full vision at all times.



Get your personnel to and from the working face quicker . . . safer! Check the advantages of the Lee-Norse Mine Portal Bus.

Lee-Norse Company

Specialists in Coal Mining Equipment
CHARLEROI, PA.

People in Coal



New Tasks Ahead

JOSEPH R. McVICKER is Republic Steel Corp.'s choice to direct company coal-mining operations, formerly handled by the retiring E. B. Winning.

With Republic for 24 yr, Mr. McVicker will be general manager responsible for coal mines in Pennsylvania, Kentucky, West Virginia and Alabama as well as certain ore mines in Alabama.

Joining the firm in 1936, he worked at the Indianola, Pa., coal mine in the firm's northern district. He was transferred to the Engineering Dept. at this area's headquarters in Uniontown, Pa., in 1941 and two years later became chief mining engineer for the northern district.

In 1957 he was named assistant chief engineer of Republic's mining districts with headquarters in Cleveland, becoming chief mining engineer in April, 1958.

Mr. McVicker was born in MacDonald, Pa., and attended Washington & Jefferson College, graduating with a B. A. degree. He followed this up with post graduate work in education at Duquesne University.

He is a member of Phi Delta Theta fraternity and the Coal Mining Institute of America. Married and living in Shaker Heights, Ohio, Mr. McVicker enjoys golf, bowling and music in his leisure time.

Clark D. Todd, new management engineer for Princess Coals, Inc., will maintain offices in Huntington, W. Va. Some years ago Mr. Todd had been with Princess Elkhorn Coal Div. of Princess Coals as a director of industrial engineering. Returning now to the firm, he will be responsible for the study and improvement of over-all organization, methods and procedures for all offices and divisions. In addition, he will have a hand in short- and long-range planning of new mines and properties and coordination of production and sales.

G. E. Sorensen, president of The Kemmerer Coal Co. and Gunn-Quealy Coal Co., of Frontier, Wyo., was elected president of the Utah-Wyoming Coal Operators Association on April 1. C. C. Cornelius, general manager of the United States Fuel Co., was elected vice president.

Mr. Clifford H. Hagy and Harry M. Meador are the new general manager and general superintendent, respectively, for Stonega Coke & Coal Co. Both have been division superintendents.

Carpe J. Robinson, general superintendent of Westmoreland Coal Co., was promoted April 1 to the position of general manager.

E. W. Moore, 38 yr in the coal industry in Utah, has been elected secretary treasurer of the Independent Coal & Coke Co. A native of Salt Lake City,

Mr. Moore joined the company in 1921 as an office boy. After various transfers and promotions Mr. Moore ended up as office manager, the post he held prior to his recent election.

Michael J. Duzik, a former Rock Springs, Wyo., coal miner, has been appointed state coal mine inspector to succeed Lyman Fearn of Rock Springs.

A. W. Rothacker, executive vice president and director of Valley Camp Coal Co., has retired. William J. Lawson, president of Great Lakes Coal & Dock Co. of Milwaukee, a wholly owned subsidiary, was elected a director to fill the vacancy caused by Mr. Rothacker's retirement.

L. T. Putman, president of the Raleigh Wyoming Mining Co., a subsidiary of Old Ben Coal Corp., retired March 1, closing out 42 yr of service. Also retiring was J. G. Miller, manager of the Norfolk, Va., office.

Lawrence B. Berger will head the Health Div. of the Bureau of Mines. With almost 40 yr of service to his credit, he will continue to make his headquarters at Pittsburgh where he has been throughout his government career. Mr. Berger will direct the Bureau's studies of environmental health hazards in mines and plants of the mineral industries throughout the United States. He is author or coauthor of about 50 technical publications and has participat-

ed in many investigations of coal-mine disasters.

James R. Garvey was named for the position of acting director of development of the Bituminous Coal Research Mining Program by the Mining Development Committee of Bituminous Coal Research, Inc. Mr. Garvey, an Ohio State graduate, holds a mining engineering degree and is director of research of Bituminous Coal Research, Inc., a position he will continue to maintain.

Obituaries

Arthur J. Pugh, general superintendent of Lillybrook Coal Co. and Amigo Smokeless Coal Co., died April 1 of a heart attack. A resident of Bolt, W. Va., Mr. Pugh worked during his lengthy career in coal with the McAlpin Coal Co., The Red Jacket Coal Co. and came to Lillybrook in 1947, where he stayed until his death.

Charles N. Templeton, president of Templeton Coal Co., Inc., and chairman of the board of the Linton-Summit Coal Co., Inc., died April 1 in Terre Haute, Ind. Besides his post with Templeton Coal and Linton-Summit, Mr. Templeton was a trustee of the Lynch Coal Operators Reciprocal Association and a past president of the Indiana Coal Operators Association.

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DACRON
Tensile Members

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NEOPRENE with
FIBER-DISPERSED Stock!

DACRON Tensile Members

GREATER STABILITY — Changes in humidity — and the resulting moisture regain — often mean a matching problem with ordinary V-Belts. The moisture regain of DACRON* is low — 0.4% — or 1/20th that of the conventional reinforcing fiber. This means far less time spent in matching, and lower belt inventory too. Because V-Belts reinforced with DACRON are more uniform, each belt carries an equal share of the load.

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STRETCH RESISTANCE — V-Belts reinforced with DACRON have low stretch. DACRON is inherently stretch-resistant and the cords are put through a special heat and tensioning process to further minimize stretch. Thus, belts reinforced with DACRON show comparatively little growth — even after many months of continued operation.

*DACRON — DuPont polyester fiber

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EXCEPTIONAL LONGITUDINAL FLEXIBILITY is provided by the virtually frictionless positioning of fibers.

EXTRA SUPPORT for the tensile members during shock-load impact and during normal operation.

WITH NEW BOSTON MULTIPLE V-BELTS YOU CAN:

- CUT DOWN MAINTENANCE
- MAINTAIN SMALLER INVENTORY
- SAVE MATCHING TIME
- SAVE TAKE-UP TIME

BOSTON

BOSTON WOVEN HOSE & RUBBER COMPANY
DIV. OF AMERICAN BILTRITE RUBBER CO., INC.
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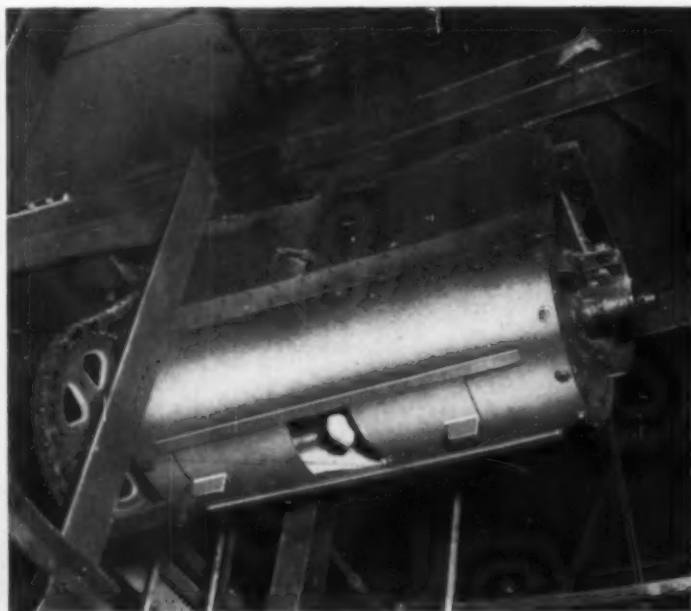
HEAT-TREATED, ABRASION-RESISTANT

The new Jalloy series includes four types designated by suffix numbers,

JALLOY 280

(Brinell range 260/300)

Has excellent low temperature impact properties. Can be bent across the width (axis of bend at right angles to direction of rolling) on a brake press or on roll forming equipment. Where forming with the axis of bend parallel to the final rolling direction, Flange Quality can be supplied on application. Recommended minimum inside radius is $2t$ (t = plate thickness) up to $\frac{1}{2}$ " inclusive in thickness and $3t$ over $\frac{1}{2}$ " in thickness.



JALLOY-280

In this cement agitator bottom saves time and money in maintenance. Jalloy offers low initial cost. And, it lasts six times longer than structural carbon steel.

JALLOY 320

(Brinell range 300/340)

Has improved abrasion resistance over Jalloy-280. Can be bent across the width (axis of bend at right angles to direction of rolling) on a brake press or on roll forming equipment. Where forming with the axis of bend parallel to the final rolling direction, Flange Quality can be supplied on application. Recommended minimum inside radius is $3t$ (t = plate thickness) up to $\frac{1}{2}$ " inclusive in thickness and $4t$ over $\frac{1}{2}$ " in thickness.



JALLOY-320

Is used in these round-bottom scoops for its formability and abrasion resistance, which effect savings in manufacture and operation.

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Abrasion resistance • Atmospheric corrosion resistance
Impact resistance • Forming properties

All at minimum cost to attain proven results

HARDNESS RANGES

PLATES FOR LONGER WEAR, LESS REPAIR

representing the mean of Brinell hardness range, and by color code for easy identification.

JALLOY 360 (Brinell range 340/380)

Has excellent abrasion-resistant properties. For best results in welding all Jalloys, a low-hydrogen AWS Spec. E 100 XX Series is recommended. Preheating and postheating are not normally required but are sometimes used in special designs to avoid concentrated stress conditions. When preheating or postheating in those cases, a range of 200/400° F. is recommended.

JALLOY 400 (Brinell range 380/420)

To be used for flat applications. This type has maximum abrasion resistance. All Jalloys hardness ranges are furnished only in the heat-treated condition because the chemical composition of alloy steels alone does not provide the optimum physical properties. Uniformity of strength, hardness and toughness are achieved by close temperature controls during heat treating operations.



JALLOY-360

Jalloy-360 in the bottom, and Jalloy-400 in the runners, give this dump body resistance to the impact of loading, and the abrasion of dumping aggregate materials.



JALLOY-400

Lasts three times as long as mild steel in this particular application. Aprons in these screens are subjected to severe abrasion from sliding 1-inch granite.

Jones & Laughlin Steel Corporation

PITTSBURGH, PENNSYLVANIA





Shooting for a fine break, 25,000 cubic yards of overburden were moved with fine fragmentation in this blast at a Bingham Canyon, Utah mine site. Nineteen 50-

pound bags of Spencer N-IV Ammonium Nitrate were used in each of twelve holes, 63 feet deep—a total of 11,400 pounds of Spencer N-IV.

Record Rock-Moving Operation Uses New Spencer N-IV



No more trouble with leaking oil. Spencer N-IV is available in 50-lb. polyethylene plastic bags, so tough they reduce breakage as much as 50%. (Also available in 50, 80, and 100-lb. multiwall paper bags.)



Completely free-flowing, Spencer N-IV is used here at the rate of 0.5 pounds per cubic yard of rock in quartzite and from 0.8 to 0.9 pounds in limestone areas.

Efficient, low-cost ammonium nitrate gives greater blast energy on giant project:

Believed to be the biggest single rock-moving contract ever undertaken in the Utah area, Western Contracting Corporation's operation is set up to move 2,000 yards of overburden per hour! The job involves moving 8 million yards of quartzite and limestone overburden on the upper levels of the Bingham Canyon mine. By using Spencer N-IV Ammonium Nitrate, the contractor is able to speed up blasting, while keeping costs low. Made by Spencer Chemical Company, the uncoated N-IV produces more energy than commercial grade ammonium nitrates—yet costs no more!

No secondary blasting has been needed because Spencer N-IV gives such excellent fragmentation. Although the oversized equipment used on the job could easily handle large boulders, the contractor prefers a fine break to keep wear and tear on the machines to a minimum. Spencer N-IV produces its superior blast effect two ways:

(1) **Spencer N-IV has a special structure** which allows the prills to absorb oil more easily, and (2) Spencer N-IV contains a much higher percentage of ammonium nitrate than other brands. Another advantage of Spencer N-IV is that it reduces priming costs because it can be initiated with a single strand of 175-grain detonating cord. No need to attach additional material at intervals, and you put an end to the danger of storing high explosives on the job site!

For more information on new Spencer N-IV Ammonium Nitrate, write to Spencer Chemical Company, Industrial Chemicals Division, 401 Dwight Building, Kansas City 5, Mo.



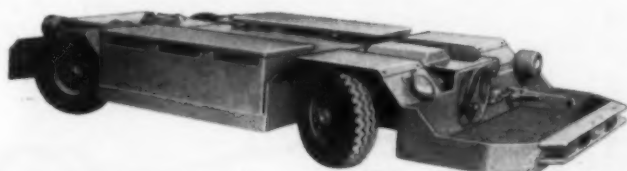
Now Piggyback!

KERSEY'S "OPERATION PIGGY-BACK" CUTS DOWN SUPPLY HANDLING COSTS AT LARGE MIDWEST MINE

Supplies loaded once at supply yard—unloaded at point of use . . . it's that simple, quick and economical!



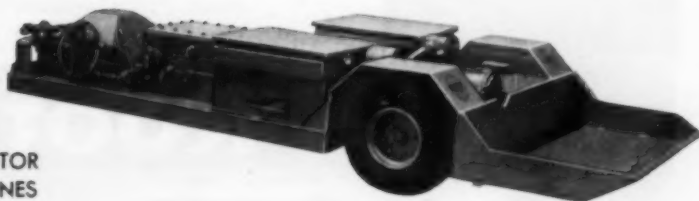
Model 612



**KERSEY MODEL 844 —
IDEAL FOR PULLING SUPPLY AND
MAN TRIP CARS IN LARGE MINES**

Heavy duty, 4-wheel drive, 4-wheel
steer and brake tractor — weighing
8,300 lbs.

Supplies are loaded by forklift truck at supply yard onto Kersey Model 612 Rubber Tired Supply Cars mounted piggy-back fashion on 5-ton rail dollies. Forklift truck shifts rail dolly loads to top of mine slope where they are lowered to bottom. Here they are met by Kersey Rubber Tired Battery Powered Tractor which takes supply cars from rail dollies into the face area where supplies are dropped off at point of use.



PPC-10

**KERSEY PPC-10 PERMISSIBLE
PERSONNEL CAR AND UTILITY TRACTOR
HAS MANY USES AROUND COAL MINES**

Used as mechanics car, supply truck or as an emergency vehicle. Rear cargo deck will accommodate stretcher to take injured personnel out of mine. Detachable cargo compartment has 2,000 lb. capacity for supplies. Unit can also double as tractor for towing supply and man trip cars.



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Coal Abroad

Italy Stands Pat on Coal Policy

Government reported unwilling to cut down on coal imports from United States.

EUROPEAN Coal & Steel Community delegates in Rome recently asked Italy to reduce coal imports from countries outside of the ECSC.

The request was met with perplexity on the part of Italian government representatives who reportedly fear that suspension of American coal imports, Italy's biggest source of supply, would also have a damaging effect on Italy's shipowners, already hard hit by drastic drops in sea freight rates.

Italy imports coal from countries outside the Community at considerably lower prices varying from \$3 to \$5 less per metric ton. Agenzia Economica Finanziaria di Rome reports that Italy in 1958 imported 8,852,756 metric tons of coal as against 11,643,357 metric tons in 1957. Value of 1958 imports amounted to \$151 million. Failure to respect new commitments could have serious repercussions in Italy's steel industry and

overall economy, increasing the costs of sources of energy.

Viewing all these hazards, Italy, it is believed, does not look with favor upon changing its coal policy unless a common decision should be reached by all the "Little Europe" member countries.

FRANCE

The problem whether to order a general reduction of coal output throughout the European Coal & Steel Community, which is suffering from a surplus was recently put before the French government.

The answer from the French officials was, in effect, that they did not see why France should "import unemployment" to reduce a European surplus for which other nations in the coal pool were responsible.

The ECSC had been considering declaring a coal crisis in the six nations of the community—France, West Germany, Italy, Belgium, the Netherlands and Luxembourg. However, the French

contend that although there has been a slight recession in the country its economic program will not entail cutting industrial output or causing unemployment.

AUSTRALIA

The biggest coal preparation plant in Australia and the biggest unit of its kind ever made in that country has gone into operation at the Coal Cliff Colliery in New South Wales, it is reported.

The plant, made by A. E. Goodwin Ltd., under license to McNally Pittsburgh, has a capacity of 400 long tph of 6x0 coal. The feldspar jigs are the first of their kind in Australia, according to reports, and have been adapted to washing fine coal of 3/8x0.

The plant is fully automatic with raw coal- and washed product-weighing facilities and a built-in laboratory for testing of ash and sink floats with a centralized grease-bar lubrication system.

Overseas Flashes

GREAT BRITAIN—Because of this nation's huge stocks of unsold coal, plans to convert two power stations from coal to oil are being postponed for a year.



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GALIS Roofmaster



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156-42" Bolts in 5 hrs.
(Name on request.)

Greatest Economy

No stopping for changing feed ports.

Greatest Manoeuvrability

Three point suspension, 4 wheel drive, each side positive control.

Dimensions:

Overall height, 24". Ground clearance, 5". Overall length with cable reel, 174". Overall length without cable reel, 160". Overall width, 61" over wheels. 5" stabilizing jack. Standard feed length, 53". Oil Tank capacity, 60 gals. Available H.P., 15.



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27-Ton, 4-Wheel Locomotive



This work horse gives you plenty of power to pull heavy pay loads with 380 total horsepower available.

Jeffrey 27-ton, 4-wheel locomotives are driven by two motors having sufficient power to slip the wheels. This assures maximum "haul ability" with a rated drawbar pull of 13,500 lbs. at a speed of 10.8 mph.

Outstanding operating and safety features may include: roller-bearing type journal boxes and motor axle suspensions—air and dynamic service brakes—automatic couplers with air-operated uncoupler—trolley with air-operated retriever—separate blower for each motor—32 volt battery-operated control and headlights.

You can depend upon this mine locomotive for day in and day out operation with a minimum of maintenance.

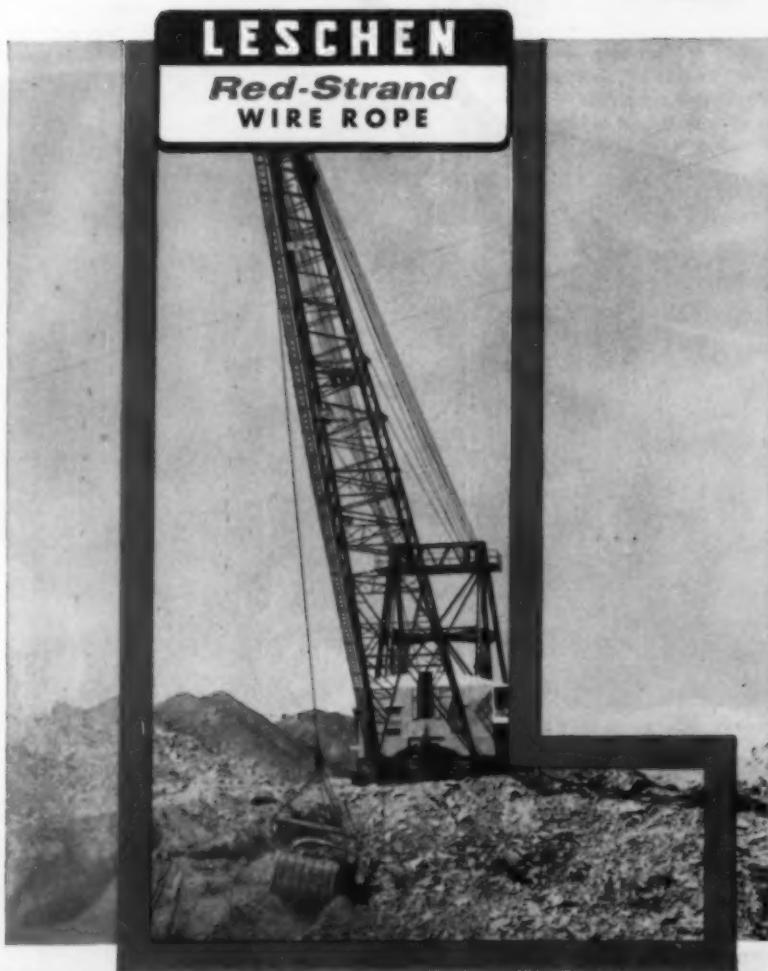
Catalog 836 describes all types of Jeffrey mine locomotives. The Jeffrey Manufacturing Company, 912 North Fourth Street, Columbus 16, Ohio.



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Leschen Red-Strand Wire Rope now and see how its uniform quality makes your operation safer, your replacement time farther in the future. Make your next order Leschen! Leschen Wire Rope Division, H. K. Porter Company, Inc., St. Louis 12, Mo.

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Coal Abroad (Continued)

It is estimated that this move will reduce the National Coal Board's 3 million-ton surplus of "small" coal by 1 million tons during the year. In 1958 oil consumption by power stations more than tripled while coal consumption by power stations fell by some 300,000 tons, say reports.

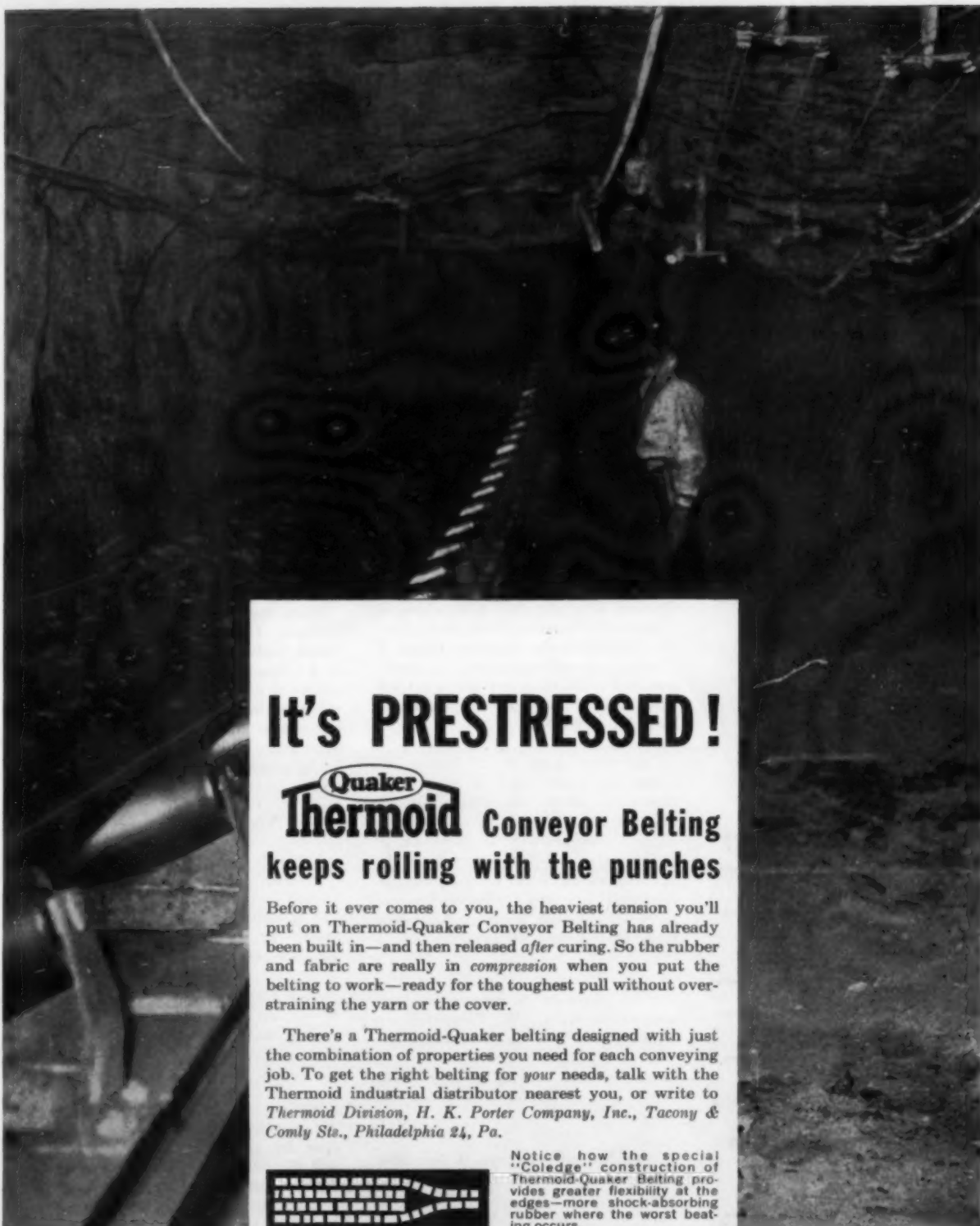
AUSTRALIA—Work is being carried out for the Victorian State Electricity Commission in Australia on a radioactive logging method for estimation of the clay content of brown coal seams. The world's biggest deposits of brown coal are said to be in Australia. Isotopes are also being used to measure moisture content continuously in brown coal in a chute feeding a dryer.

BULGARIA—Within the next 4 yr Bulgaria reportedly plans to increase annual coal production to 19 million tons. An extensive investment program calls for establishment of 24 new coal mines and for existing mines to be modernized.

RUSSIA—Blueprints for a new walking excavator with a scoop that will dig 50 cubic meters at bite and with an arm 125 meters long are reportedly being prepared at a heavy machine-building plant in the Ural mountains. The machine, intended for open-pit mining, will be able to dig between 15 and 18 million cubic meters of coal a year, according to reports—twice as much as the biggest walking excavator in the world built last year at the same plant in the USSR, say the Russians.

TURKEY—This nation is getting a loan of \$14.5 million from the United States Development Loan Fund to finance foreign-exchange costs of further developing the output of the Zonguldak bituminous coal mines in Turkey. Dempster McIntosh, managing director of the DVL, said the loan would be used to procure equipment, material and services necessary to improve the operation of mines and related facilities to sustain an annual gross production level of over 7 million tons.

INDIA—The Indian Planning Commission is aiming at a total coal output of 100 million tons by 1967, say reports. India produced 45 million tons in 1958 and to raise the output to 100 million will cost the country around \$160 million. Expansion schemes now under way include a new mine at Korba (central India), and an openpit mine to produce 1 million tons. Privately-owned Indian collieries, now freed from fear of nationalization by a Government promise, in 1958 stepped up their output to 39.5 million tons, 5 million more than the output in 1955.



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THE NOLAN COMPANY

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Current Coal Patents

By: Oliver S. North

Press for separating material, F. M. Van Tillo (assigned to Stamicarbon N. V., Heerlen, Netherlands), Mar. 10, 1959. Design for a roller press useful for separating liquid from finely divided solid material, e. g., water from coal slurry, by compression of the material. No. 2,876,697.

Blasting plug, L. W. Householder (assigned to National Mine Service Co., Pittsburgh, Pa.), Mar. 10, 1959. Design for a blasting plug useful in the mining of coal or other minerals. No. 2,876,700.

Suspension troughing idler and supporting means therefor, G. Baechli (assigned to Joy Mfg. Co., Pittsburgh, Pa.), Mar. 10, 1959. Improved journaling arrangement for a suspension-type troughing idler. No. 2,876,890.

Trimmer chain tensioning arrangement for boring type mining machine, W. Silks (assigned to Goodman Mfg. Co., Chicago, Ill.), Mar. 10, 1959. Compact hydraulically occurring actuated mechanism for maintaining the cutter chains of a boring type mining machine in properly tensioned condition in response to vertical adjustment of the chain-carrying cutter bars. No. 2,877,005.

Coal-cutter chains, S. E. Proctor (assigned to Austin Hoy & Co., Ltd., Saunderton, High Wycombe, England), Mar. 10, 1959. The jib carrying a cutter chain is provided with a roller-track, or tracks and rollers are provided on the chain to run on the tracks, to ensure free running of the cutter chain around curves in the jib, thereby reducing the operational friction between them. No. 2,877,006.

Floor clean-up mechanism for continuous miner, C. W. Fitzgerald (assigned to Joy Mfg. Co., Pittsburgh, Pa.), March. 17, 1959. Improved means for mounting and driving the clean-up scrolls on a continuous mining machine. No. 2,877,882.

Troughed belt conveyor, O. Noe, Mar. 17, 1959. Design for a variable-length mine conveyor which is low in cost and light in weight. The belt is fixed to cross bars at intervals of 3 to 7 feet. Some of the bars are provided with lateral rollers. No. 2,877,887.

Method and apparatus for separating materials of different specific gravity, S. A. Jones (assigned to Consolidation Coal Co., a corporation of Pa.), Mar. 17, 1959. Efficient method and apparatus

for cleaning coal in a heavy density fluid medium in conical separation zones. Accumulations of waste in the cone are avoided by maintaining satisfactory media density. No. 2,877,896.

Method and apparatus for sink and float separation for minerals of small particle size, N. L. Davis, Mar. 17, 1959. Method and apparatus for separating fine coal particles from free impurities, such as slate, pyritic sulfur, etc. The density of the medium is adjusted to float the coal. No. 2,877,897.

Continuous mining machine with vertically separable cutter carrying units, C. H. Synder, D. A. Turner and H. C. Funk (assigned to The Colmol Co., New Lexington, Ohio), Mar. 17, 1959. Apparatus for spreading and retracting the coal digging mechanism to follow variations in seam height, thereby enabling the operator to cut out all of the coal and little or none of the waste, regardless of rolls, dips, etc. No. 2,877,999.

Strata mining-adjacent seam hardness indicator, G. T. Felbeck (assigned to Union Carbide Corp., a corporation of N. Y.), Mar. 17, 1959. In remote control mining of a seam of coal, means are provided for indicating at the remote control station the relative hardness of a seam above or below the selected strata being mined, thereby avoiding damage caused by operating the cutter in material that is too hard to be worked. No. 2,878,000.

Vertically and laterally expansible continuous mining machine, C. H. Snyder and H. C. Funk (assigned to The Colmol Co., New Lexington, Ohio), March. 17, 1959. Design for a highly maneuverable continuous miner having a digging mechanism that can be expanded both horizontally and vertically. Rooms can be cut at right angles to the entries, thereby forming stronger and safer ribs without varying the sizes of the entries or rooms.

Anchor bolt, L. R. Starling and J. A. Tiffany, Mar. 24, 1959. Novel rock anchor for anchoring cables, roof bolts, and the like comprises a rod having a sloping surface which cooperates with a serrated wedge having two wedging faces; the first face engages the rod and the second the side of the hole. No. 2,878,068.

Adjustable arm for a rotary cutting head, W. N. Poundstone (assigned to Consolidation Coal Co., a corporation of Pa.), Mar. 24, 1959. Improved rotary cutting head for use with a mining machine which cuts circular kerfs in the

In close quarters . . .



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Where space—and time—is at a premium, the requirement is an expansion unit that “goes up easy and stays put!” Here flexibility is critically important—the ability to compensate for and overcome slight variations in the size and shape of the bolt hole. Here fast-setting expansion is a must—the ability to expand fast and hold fast in soft friable shale as well as hard rock. Here four-way expansion, low unit stresses, maximum *effective* use of the anchor's strength mean faster, safer, more efficient bolting—and here more and more operators are now specifying O-B expansion shells and plugs!

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Patents (Continued)

coal face. Adjustable arms can be easily retracted to make the machine more maneuverable in operation and permit the size of entries to be readily varied. No. 2,879,049.

Explosives, F. W. Brown, Mar. 24, 1959. A low cost mining explosive having great shattering power is made by saturating with liquid oxygen a mixture of ammonium nitrate and graphite or low volatile coal coated with lamp black or gas black. This explosive has the advantage of lower fire sensitivity and deforma-

tion sensitivity than L.O.X. No. 2,879,149.

Mobile conveyor apparatus for underground mines, J. F. Joy (assigned to Joy Mfg. Co., Pittsburgh, Pa.), Mar. 31, 1959. Design for an improved mobile, self-propelled conveying apparatus which can be easily maneuvered to accommodate itself to varying conditions encountered in the continuous mining of an underground coal seam. No. 2,879,884.

Mine vein-attacking and disintegrating mechanism having a head frame with an adjustable outer end portion,

J. R. Sibley (assigned to Joy Mfg. Co., Pittsburgh, Pa.), Mar. 31, 1959. Improved guiding and adjusting means for the adjustable outer end portion of the head frame of a continuous miner. No. 2,879,981.

Coal mining machine, V. J. McCarthy (assigned to The Salem Tool Co., Salem, Ohio), Apr. 7, 1959. Design for a mining machine adapted for using mining heads and helical conveyors of various diameters, whereby the same machine may be used to mine coal seams of varying thickness. No. 2,880,707.

Closed circuit pipeline and control system therefor, T. J. Regan, S. A. Jones and E. J. Wasp (assigned to Consolidated Coal Co., Pittsburgh, Pa.), Apr. 7, 1959. Design for a closed circuit pipeline employing booster stations and adapted to transport coal slurries over long distances. No. 2,880,745.

Initiating in situ combustion in a stratum, H. W. Parker (assigned to Phillips Petroleum Co., a corporation of Del.), Apr. 7, 1959. The described process for initiating in situ combustion in a carbonaceous stratum and recovering hydrocarbons therefrom is said to be especially suitable for porous lignitic-type coal beds. A fuel gas and oxygen are injected and ignited. No. 2,880,803.

Mining machine, E. D. Abraham (assigned to Joy Mfg. Co., Pittsburgh, Pa.), Apr. 7, 1959. Design for a rotary gathering mechanism for a coal loading machine or continuous miner, wherewith coal can be loaded from the sides as well as directly forward in the path of the machine. No. 2,880,842.

Belt conveyor, J. C. Salmons (assigned to Goodman Mfg. Co., Chicago, Ill.), Apr. 7, 1959. An improved articulating troughing roller assembly which will shift its troughing rollers in a direction to insure proper tracking of the conveying reach. No. 2,880,851.

Belt tension limiting device for belt conveyors, E. R. Bergmann (assigned to Goodman Mfg. Co., Chicago, Ill.), Apr. 7, 1959. Method for limiting the tension of a conveyor belt to a value maintaining the bearing loads against the driving and idler pulleys below a predetermined value. No. 2,880,852.

Ground protection device, C. O. Wood (assigned to Goodman Mfg. Co., Chicago, Ill.), Apr. 7, 1959. Device for protecting operators against hazard in the operation of electrically-powered mining machines supplied with power from a remote source. The supply circuit can be energized only when the machine is attended by the operator. No. 2,881,861.



A standard preassembled control panel is provided with all Amplitrol feeders, and is ready for immediate service when external air and a-c power connections are made. Control can be local or remote, manual or automatic. Responds to any standard process instrumentation.

Now! A Mechanical Vibrating Feeder With Variable, Stepless Control

The exclusive Carrier Natural-Frequency drive, and a unique new amplitude control system—these two features of the new Carrier Amplitrol feeder give you benefits found in no other vibrating feeder, electromagnetic or mechanical.

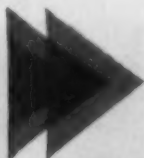
LESS DAMPING . . . Amplitrol feeders increase vibrating stroke automatically when headload is increased. This allows you to use larger bin openings . . . bigger headloads . . . and to discharge bigger capacities of almost any material.

FULL-RANGE CONTROL . . . A new, highly simplified pneumatic system allows accurate, full-range stroke control. The heavy-duty air springs respond immediately to a pneumatic signal from a standard 0-80 psi air pressure valve. No lag.

LESS MAINTENANCE . . . Amplitrol feeders have no chains or v-belts . . . no large revolving weights or bearings . . . no auxiliary electrical parts . . . no gears or guards . . . **NEW AMPLITROL FEEDERS ARE JUST THAT SIMPLE.**

Send for new 12-page bulletin describing all Amplitrol benefits in detail. Carrier Conveyor Corporation, 254-A North Jackson Street, Louisville, Ky.

CARRIER
NATURAL-FREQUENCY
VIBRATING EQUIPMENT
Engineering Specialists in Vibrating Equipment



CONVEY • FEED
DEWATER • SCREEN
COOL • AGGLOMERATE
DRY • SCALP • COAT
DISTRIBUTE • ELEVATE

Right off the

Wire

21. Simplex takes pleasure in extending an invitation to old friends and new to visit their Booth #1611 at the American Mining Congress Coal Show, Cleveland Public Auditorium, May 11th through May 14th.

22. A 600-passenger ocean liner which will run on hydrofoils is in the design stage.

23. The first rocket-camera has been used to photograph cloud formations over the Atlantic.

24. An electrostatic device can separate particles of different materials. It can sort flour milling stocks, separate grains of different minerals and distinguish between healthy and unhealthy seeds.

25. A new magnetic recording tape has a protective lamination over the oxide to prevent wear.

26. A solid electrolyte battery has been developed that is said to be suitable for commercial production.

27. There are now three large offices where individual desk telephones can be reached from the outside by direct dialing.

28. Mercury batteries reduce the weight of a clock radio, made especially for travelers, to less than three pounds.

29. Stereophonic radio has hitherto required both AM and FM for transmission. A new method uses AM only.

30. The light from a recently patented underwater flash bulb is of such brief duration that fish are not frightened by it.

31. Crevasses in glaciers or ice fields can be detected by a device that can be carried in an airplane. It measures the difference in heat radiation between solid and hollow ice and records on film.

32. Tissues, skin, veins, arteries and circulating blood are all realistically simulated in an imitation human body designed for first aid training.

33. A heating element for use in floors or walls is made of paper in which copper strips are embedded.

Further information on these news items and on Simplex cable is available from any Simplex office. Please be specific in your requests.

34. A patent for an acoustical method of stimulating the flow of oil wells has been issued. The sound waves will actually shatter rock.

35. For the first time, an airplane has been guided over land by a missile system using radar to scan a photograph of the terrain.

36. An attachment for a telephone intended for use by a number of people kills germs with ultraviolet light.

37. Electroluminescent panels that emit cool light from a flat glass plate are now made in six colors.

38. Entirely new principles of heating and cooling are used in a unit that keeps foods hot or cold. It is mounted on wheels, uses batteries for power and can be rolled anywhere in or out of the house.

39. Ticker tape is being projected on a screen with letters and figures two feet high at the New York Stock Exchange.

40. A method of bouncing short waves off man-made reflectors in the sky has been patented. It can be used for radio or television.

41. America's annual bill for corrosion is 6 billion dollars, according to recently revised figures. Simplex Wire & Cable Co. has prepared a bulletin on this expensive problem and the most effective means of combating it. Write for Bulletin 1033.



Thirty-eight years ago Simplex Wire & Cable Co. announced the TIREX line of rubber-jacketed and insulated cords and cables to the mining industry. These cables featured the Simplex developed "cured-in-lead" process which produced a dense, tough and yet highly flexible sheath. To an industry plagued by severe operating conditions, the TIREX line of power and control cables provided unmatched dependability and service life.

Today, manufactured with the same proven "cured-in-lead" process and embodying vastly improved insulating and jacketing compounds, Simplex TIREX is still the first choice wherever operating conditions are at their worst.

SIMPLEX WIRE & CABLE CO.
Cambridge, Massachusetts and
Newington, New Hampshire

Simplex

Highest quality cables for: Mining
Power & Lighting • Construction
Transportation • Communications
Signalling



"Our Ford F-800's, pulling 20-ton payloads, give us mighty good service!"

*says R. Dillard Teer, Vice President
Nello L. Teer Co., Durham, N. Carolina*

"We operate about 115 Ford Trucks ranging in size from ½-ton pickups to Tilt Cab Tandem tractors. We believe in carefully fitting the truck to the job to be done and usually stay within the manufacturer's recommended ratings. We make an exception to this rule with our Ford F-800's, pulling 20-ton loads in aluminum trailer dumps to our quarry and crushing setup at Durham, North Carolina. These units are carrying the maximum legal limit and give us mighty good service!

"We haven't traded any trucks in about 6 years. It just happens that our company has

been growing so rapidly that when we buy a new truck, usually an F-800, I put it under one of our trailer dumps. Then I'll take the old truck, lengthen the chassis, and make a grease outfit or a water wagon out of it. I would say out of over a hundred Ford units in the past 7 or 8 years, we have gotten rid of only a dozen altogether—and some of these were wrecked or burned.

"Another reason we use Fords is that this business is rough on trucks, so parts availability is very important. Our experience over the years with Ford as compared to Ford competitors has been definitely in favor of Ford on parts."



NOW! CERTIFIED PROOF!

FORD TRUCKS COST LESS

**'59 Ford Pickups
beat average mile-
age of other leading
makes by 25.2 % in
Economy Showdown U.S.A.**

Here at last is certified proof of the differences in gas mileage between six-cylinder pickups . . . evidence that you can use in your operation.

It was compiled by America's foremost independent automotive research firm after testing 1959 six-cylinder, 1/2-

ton pickups of the six leading makes. All trucks were bought from dealers—just as you would.

The tests paralleled every kind of driving—high speeds and low, open highways and city traffic, even door-to-door delivery. And in every test, '59 Ford Sixes delivered more miles per gallon than any other make. Here are the actual percentages:

'59 FORD PICKUP SIXES GAVE
42.6% better mileage than make "D"
31.1% better mileage than make "I"
25.2% better mileage than make "C"
22.0% better mileage than make "S"
9.6% better mileage than make "G"

Taken together, Ford got 25.2% more miles per gallon than the average of all other leading pickups!

What's the secret of Ford's economy? First, of all pickup sixes, only the Ford Six has modern Short Stroke design which reduces friction and requires less fuel. Second, to this modern engine, Ford has added a new economy carburetor to meter fuel more precisely in both high- and low-speed ranges.

See your Ford Dealer for the full report of Economy Showdown U.S.A. and get the whole story firsthand.



Now! During Dividend Days at your Ford Dealer's...Go FORD-ward for Savings

Preparation Facilities

Beckley Transportation Co., Donegan tippie No. 8, Richwood, Va.—Contract closed with Link-Belt Co. for multilouvre dryer to handle 125 tph of ¼x0-in fraction.

Weyanoke Coal & Coke Co., Arista, W. Va.—Contract closed with The Deister Concentrator Co., Inc., for one Concenno No. 77 Diagonal-Deck washing table to handle ¼x0-in bituminous.

Mineral Coal Co., St. Clair, Pa.—Two SuperDuty Diagonal Deck No. 7 washing tables to treat No. 3 buck and No. 4 sizes of anthracite.

Alliston Engineering Co., Allison Park, Pa.—Contract closed with the Jeffrey Mfg. Co. for one No. 200 unit washery to handle 175 tph of 5x48 in coal at Sligo, Pa., mine.

Southern Electric Generating Co., Mine No 1, Parrish, Ala.—Contract closed with The McNally Pittsburg Mfg. Corp. for plant including one McNally Giant washer and McNally 40-car capacity shuttling car haul, for handling 3x0 raw coal. Completion for Jan., 1960.

West Virginia-Kentucky Coal Co., McAndrews, Ky.—Contract closed with the Daniels Co., Contractors, Inc., for fine-coal cleaning facilities to be installed in recently completed DMS dense-media cleaning plant.

Slab Fork Coal Co., Slab Fork, W. Va.—Contract closed with The Eimco Corp. for one unit consisting of a 6-ft dia, 6 disc, Eimco Agidisc filter and accessories. To handle 8 tph of 38x0 mesh coal. Completion scheduled for summer, 1959.

Equipment Approvals

Thirteen approvals were issued during March.

Acme Machinery Co.—Model 275-A4JRC air compressor; one motor, 75 hp, 440 V, AC. Approval No. 2F-1446A, March 3.

Joy Mfg. Co.—Type X849-8 belt conveyor drive unit; one motor, 40 hp, 500 V, DC. Approval No. 2F-1447A, March 3.

The Jeffrey Mfg. Co.—Type 94-B conveyor; one motor, 5 hp, 250 V, DC. Approval No. 2F-1448, March 3.

The Long Co.—Type LRB roof-bolting machine; one motor, 5 hp, 230 V, DC. Approval No. 2F-1449, March 5.

Joy Mfg. Co.—Types 12RB and 12RT coal-cutting machines; two motors, one 30 hp and one 50 hp, 220/440 V, AC. Approvals Nos. 2F-1450 and 2F-1450A, March 9.

Galis Electric & Machine Co.—Model 300 rotary roof-drilling machine; one motor, 10 hp, 230 V, DC. Approval No. 2F-1451, March 11.

Acme Machinery Co.—Model HSJ-4WD drill truck; one motor, 20 hp, 550 V, DC. Approval No. 2F-1212A, March 11.

The Jeffrey Mfg. Co.—Type 94-B conveyor; one motor, 5 hp, 500 V, DC. Approval No. 2F-1448A, March 11.

Manson Machine Co.—Model 100P open tank wet rock duster; one motor, 3 hp, 440 V, AC. Approval No. 2F-1452A, March 23.

Acme Machinery Co.—Model 275-S skid-mounted air compressor; one motor, 65 hp, 550 V, DC. Approval No. 2F-1095A, March 25.

The Jeffrey Mfg. Co.—Type MT66 shuttle car; three motors, two 7½, 10 or 15 hp, and one 10 or 15 hp 550 V, DC. Approval No. 2F-1453A, March 27. (Continued)

Coal Men on the Job



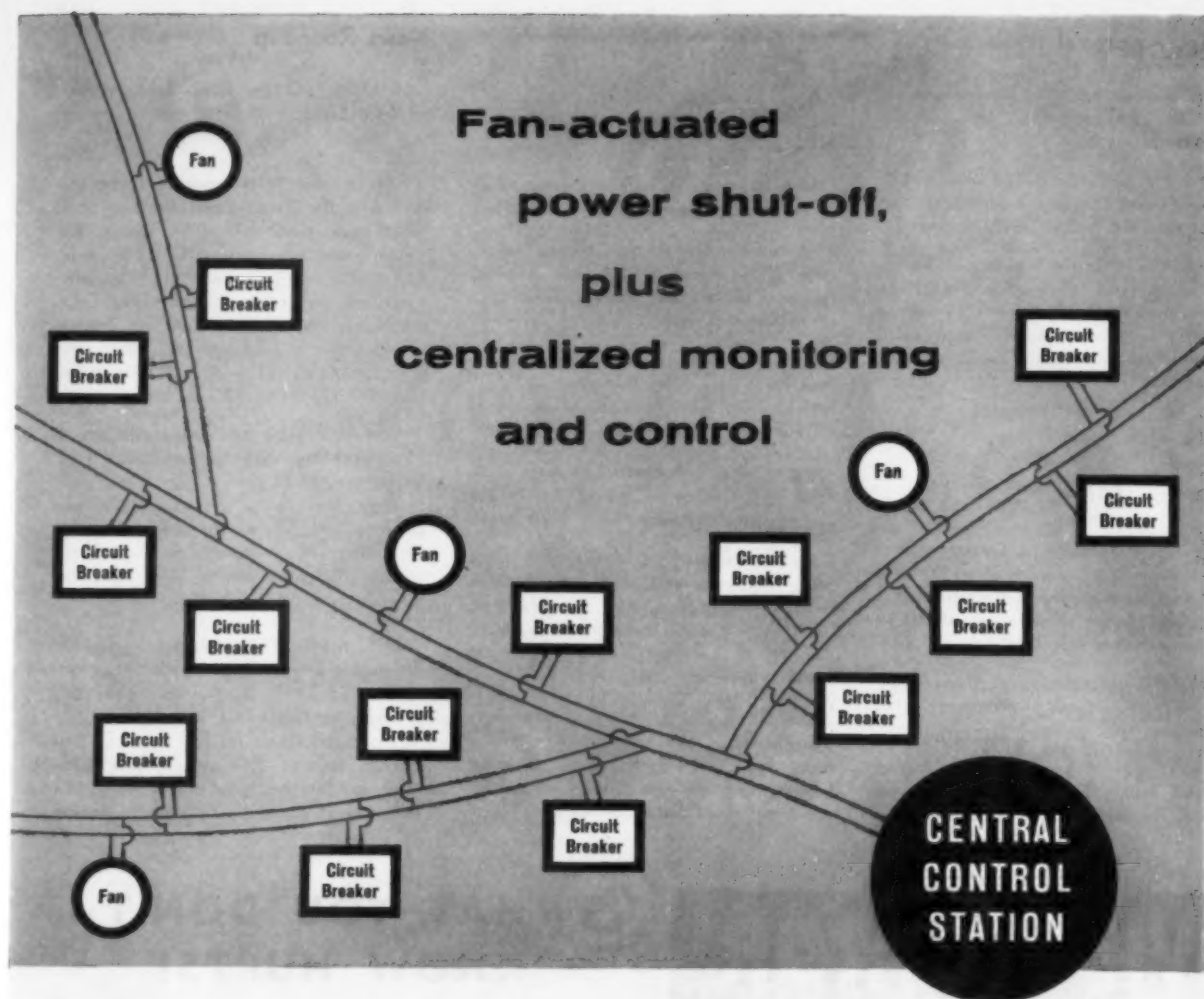
EVENING SHIFT SUPERVISORY FORCE at Boone County Coal Corp., Sharples, W. Va., are: (standing left to right) T. W. Cline, general mine foreman; Lon Hager, section foreman; Raymond Vance, section foreman; (seated left to right) Bill Cook, inside maintenance foreman; and Jerry Wolford, section foreman.



DAY SHIFT SUPERVISORY FORCE at Boone County Coal Corp., Sharples, W. Va., are: (standing left to right) Lako Smith, Foy Miller, Gale Stepp, section foreman; (seated left to right) Palmer Sarver, assistant mine foreman; J. R. Brown, general mine foreman; and Gaither Knight, section foreman.



INSIDE MAINTENANCE CREW at Boone County Coal Corp., Sharples, W. Va., are: (left to right) Bob Williams, Charles Hosser, Willie Lane, Argus Hendric and Paul Morrison.



...over a single pair of wires

Here's what this new FEMCO system provides:

1. **Automatic shut-off** of power going into the mine, in the event of fan failure.
2. **Centralized monitoring** of all fans and circuit breakers.
3. **Selective remote control** of circuit breakers.

Any number of fans and circuit breakers, in any combination, can be handled over a single pair of wires in the mine or on the surface.

Fan monitoring is continuous. Two indications for each fan are provided, one showing that fan pressure is normal, the other showing fan speed. Loss of pressure at any fan automatically shuts off all power to the mine after a predetermined interval from 0 to 30 minutes. It

also sounds an alarm, at the office, which continues until silenced. Monitoring of circuit breakers is on a programmed basis.

The time-saving advantages of this system are obvious. Fan monitoring permits instant identification of the fan which is malfunctioning, and centralized control of circuit breakers makes it possible to restore power at all locations in less time than it would take a man to reach any one of them.

Femco Monitoring and Control Systems are now in operation in a number of leading coal mines, and more installations are being made each month. For full information, write to FEMCO, INC., IRWIN, PA. We will be glad to discuss your specific requirements.

VMA 6427

Femco

COMMUNICATIONS: Carrier and direct wiring systems for all mining and industrial applications. **MONITORING:** Fans, circuit breakers, valves, pumps, compressors, etc. **TELEMETRY:** Flows, pressures and other functions. **REMOTE CONTROL:** Pumps, valves, circuit breakers, rotating pit covers, furnace fuel oil valves, or other moving equipment.

Equip. Approval (Continued)

J. H. Fletcher & Co.—Cleanup machine; one motor, 10 hp, 550 V, DC. Approval No. 2F-1454A, March 30.

J. H. Fletcher & Co.—Type DKC7-H-C2-R2 roof control drill; one motor, 20 hp, 240 V, DC. Approval No. 2F-1455, March 31.

In addition to the above permissible equipment, Acceptance Designation No. 28-26 was assigned to the Globe Woven Belting Co., Inc., to identify conveyor belts which have been accepted by the Bureau as being fire resistant.

Meetings

Appalachian Underground Corrosion Short Course, June 2, 3 and 4—West Virginia University, Morgantown, W. Va. Thirty-eight papers on underground corrosion, exhibits by manufacturers and suppliers.

National Coal Association, 42nd Annual Convention, June 3 and 4—Shoreham Hotel, Washington, D. C.

West Virginia School of Mines, Mining Extension Dept.'s Ninth Annual Short Course in Coal Preparation, June 8 to July 17—

West Virginia University, Morgantown, W. Va.

Open Pit Mining Association, June 18—Missouri School of Mines & Metallurgy, Rolla, Mo.

Mine Inspectors Institute of America, June 21-24—Terre Haute House, Terre Haute, Ind.

Air Pollution Control Assn. annual meeting, June 22-26—Hotel Statler, Los Angeles. Technical sessions and exhibits devoted to air pollution control.

Rocky Mountain Coal Mining Institute, June 28, to July 1—Antlers Hotel, Colorado Springs, Colo. Subjects include modern mining methods, new equipment, safety, etc.

International Briquetting Association, Briquetting Conference, August 24, 25 and 26—Glacier Park Lodge, Glacier Park, Mont.

Gordon Research Conference, June 15 to Sept.—Colby Junior College, New London, N. H., New Hampton School, New Hampton, N. H., and Kimball Union Academy, Meriden, N. H. Lectures and conferences to stimulate research in science.

The Council of Underground Machinery Manufacturers, Mining Machinery Exhibition, July 9-18—Grand Hall, Olympia, London, Eng. includes display of mining equipment made during last decade.

News Roundup (from p 28)

coal in the Castle Rock field, would produce about ½ million tons per year and employ about 35 men.

New machinery is expected to be installed at the Truax-Traer Burning Star No. 2 mine, northwest of Du Quoin, Ill.

The mine, employing about 150 men, now produces 4,000 tons daily. The new machinery will be used in preparing raw coal for market by washing and drying it. Since the mine opened in 1951, raw coal has been taken to a Truax mine near Pinckneyville, Ill., for preparation.

New orders for coal mine equipment have been reported by the Nolan Co., Bowerston, Ohio.

They include a Nolan rotary car dumper and Nolan trip feeder for the Columbia-Geneva Div., U. S. Steel Corp., for installation in their Horse Canyon mine in June or July of this year.

U. S. Steel's Frick District employees attained a 54% reduction in lost-time accidents in 1958, R. C. Beerbower Jr., general superintendent, announced.

The district's record low accident frequency rate of 3.10 per million man-hours worked last year compares with a lost-time frequency rate of 6.97 during

VIBROLATOR®

Heavy duty vibration inducer moves, sifts, compacts materials

High-amplitude vibrations • Portable • Shock and spark proof • Pneumatically driven • Quiet operation • Precise control through a range of a few cycles per second to 60 cycles per second



Starts wet or dry materials moving—and keeps them flowing from railroads cars, massive hoppers, bins, chutes or conveyors. Pneumatically driven, the CCVP operates at low-noise level in all frequencies. Portable, with its own mounting clamps, unit can be mounted in any position or angle convenient to the job. Unconditionally guaranteed to give satisfaction. "Vibrolator" is Martin Engineering's registered trade mark for its vibration inducers and vibrator accessories.

MARTIN ENGINEERING COMPANY

159 Cool St. Napanset, Illinois

"Vibrolator" vibrators are available in a wide range of sizes "pocket watch" to the most powerful hand-portable unit built. Call your distributor or write for free catalog.

Equipment on display AMC Coal Show—Booth #631

WHAT YOU DON'T KNOW HURTS!

Most key mining officials read COAL AGE because it helps them do a better job.

If you're not a regular subscriber, Mail this coupon TODAY

COAL AGE, Fulfillment Manager,
330 West 42nd St., New York 36, N. Y.

Send me COAL AGE for 1 year at \$3 (U.S. and Canada only).

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To Save Delay, Please Fill Out Completely CA559



"WRENCHES GO HOME!"

The Amoco mine lubrication engineer is trained to "keep the monkey wrenches out of machinery." He knows all kinds of mine equipment by make and model...knows just which of Amoco's complete line of quality tested lubricants to use for top performance at low-

est cost. Why not use his services as hundreds of deep and strip mine engineers are doing? He'll make a careful survey of your special needs without charge. Contact your nearest Amoco office, or the American Oil Company, 555 Fifth Avenue, New York 17, New York.

AMOCO LUBRICANTS

FOR MINE MACHINERY



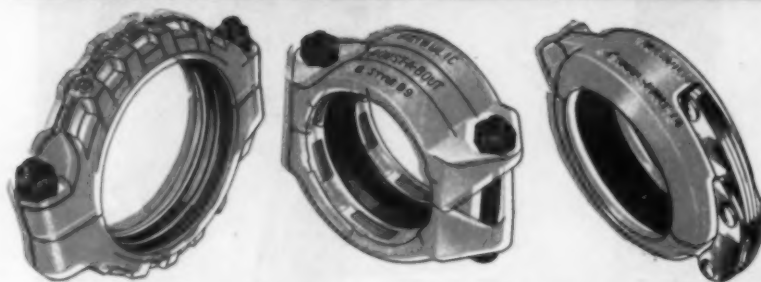
When you want top performance, you want Amoco

VICTAULIC®

METHOD OF PIPING



VICTAULIC HAS EVERYTHING...



VICTAULIC COUPLINGS

Simple, fast, reliable. Styles 77, 77-D, for standard uses with steel or spiral pipe, — Style 75 for light duty. Other styles for cast iron, plastic and other pipes. Sizes ¾" to 60".

ROUST-A-BOUT COUPLINGS

For plain or beveled end pipe Style 99. Simple, quick, and strong. Best engineered and most useful plain end coupling made — takes a real "bull-dog" grip on the pipe. Sizes 2" to 12".

VICTAULIC SNAP-JOINTS

The new, boltless, speed coupling, Style 78. Hinged into one assembly for fast piping hook-up or disassembly. Hand locks for savings in time and money. Ideal for portable lines. Sizes 1" to 8".

COUPLINGS FOR EVERY PIPING JOB



VICTAULIC FULL-FLOW FITTINGS

Elbows, Tees, Reducers, Laterals, a complete line—fit all Victaulic Couplings. Easily installed — top efficiency. Sizes ¾" to 12".



VIC-GROOVER TOOLS

Time saving, on-the-job grooving tools. Light weight, easy to handle — operate manually or from any power drive. Sizes ¾" to 8".

PLUS FITTINGS AND GROOVING TOOLS

"EASIEST WAY TO MAKE ENDS MEET"

Promptly available from distributor stocks coast to coast.
Write for NEW Victaulic Catalog-Manual No A-5.

VICTAULIC COMPANY OF AMERICA
P. O. BOX 509 • Elizabeth, N. J.

Mines, Companies (Continued)

1957. Six district surface facilities operated the entire year without a single lost-time accident. These included the Robena coal preparation plant, Colonial belt, Egerson shop, Filbert shop, Leckrone timber-treating plant and the general engineering and construction department including the Maple Creek mine presently under construction. Mr. Beerbower attributed the outstanding record to the safety-minded employees' strict adherence to safe mining practices.

The Independent-Producers Coal Sales Co. announces its formation.

It has been created to serve as a clearing house of information for independent coal producers, and to pass this information on to industry, as well, as to act as sales agents for such coal firms.

Utilization

Lyonart Industries has started construction on a scaled-down continuous coal-reduction pilot plant at its research laboratory in Trinidad, Colo.

H. A. Lyon, designer of the process, anticipates that a high rate of yield of coal tar by-products chemicals will be forthcoming in addition to coke, distillation products and gas. It is hoped the plant will use its own gaseous products in the reduction process. Plans for a chemical by-products plant are being considered.

Advances in Bureau of Mines coal research include a successful experiment in Germany in gasifying Pennsylvania anthracite, according to reports.

Another Bureau achievement reported is the design and construction of a simulated reactor to be used in studies aimed at using nuclear heat to gasify bituminous coal.

Curtis-Wright Corp. has been experimenting with a road-paving material made of coal.

The coal project has been confined to bituminous coal so far, but may be extended to anthracite, officials report.

The contract has been awarded for another new \$6 million battery of by-products coke ovens at the Pittsburgh Works of Jones & Laughlin Steel Corp.

The new battery, which will consist of 59 smokeless coke ovens with a rated monthly capacity of 30,000 tons of coke, is to be built by the Wilputte Coke Oven Div. of Allied Chemical Corp. Wilputte also is the contractor for a 50-oven battery currently under construction.

(Continued on p 56)

Continuous production hangs on this shaft cable

Falling in unbroken, near-record drops of one-third of a mile each, two Okolite 5kv, strip-insulated shaft cables carry every bit of power down two separate shafts to Inter-mountain Chemical Company's vast trona mine in Westvaco, Wyoming . . . to operate diggers, loaders, conveyors, hoists, lights and blowers. Production, profits—and lives—depend on the absolute reliability of these cables.

"The cables are continually drenched by condensing moisture," says Jack Wilson, Inter-mountain's Maintenance Supervisor. Great length of the suspension puts tremendous vertical pressure on the cable components. Considering their importance as well as the tremendous job of replacing them, Inter-mountain naturally wanted the most reliable, longest-lived cable they could get. Those were two good reasons for choosing an Okolite-insulated construction.

For **your** circuits that must not fail . . . be sure to call in Okonite. For information on choosing the right cables for your jobs . . . write for free Bulletin CA-1117, The Okonite Company, Passaic, New Jersey.

NEAR-RECORD CABLE DROPS

length: 1700 feet in each shaft

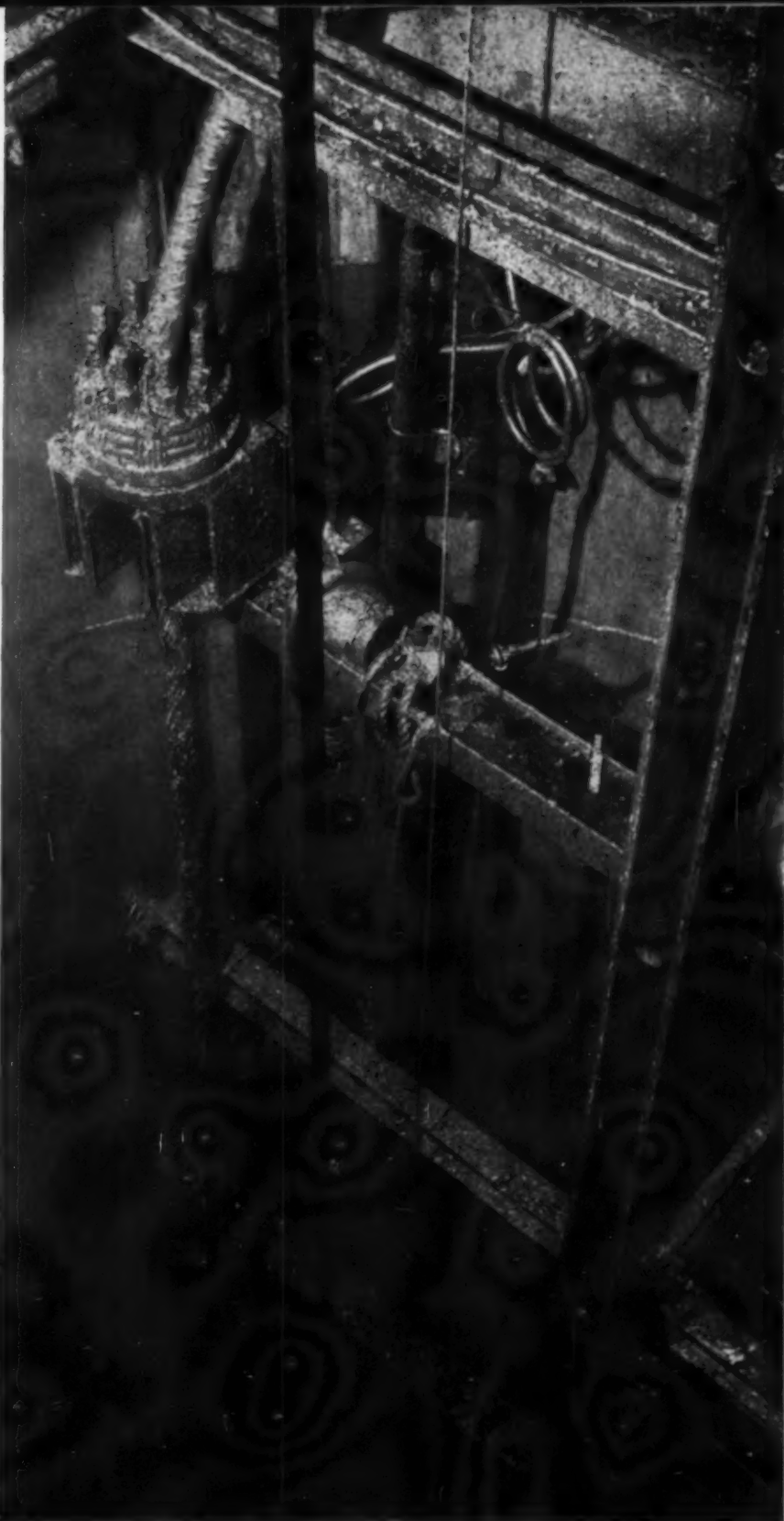
suspension: from a single clamp at shaft collar

construction: 3/c. 5kv, Okolite-insulated by strip process, with galvanized steel armor overall

weight: 19,000 lbs. each

tested: by 40,000 volts DC each

circuit and load: 4,160 volts from termination of Okolite-Okoprene aerial cables to power centers in mine



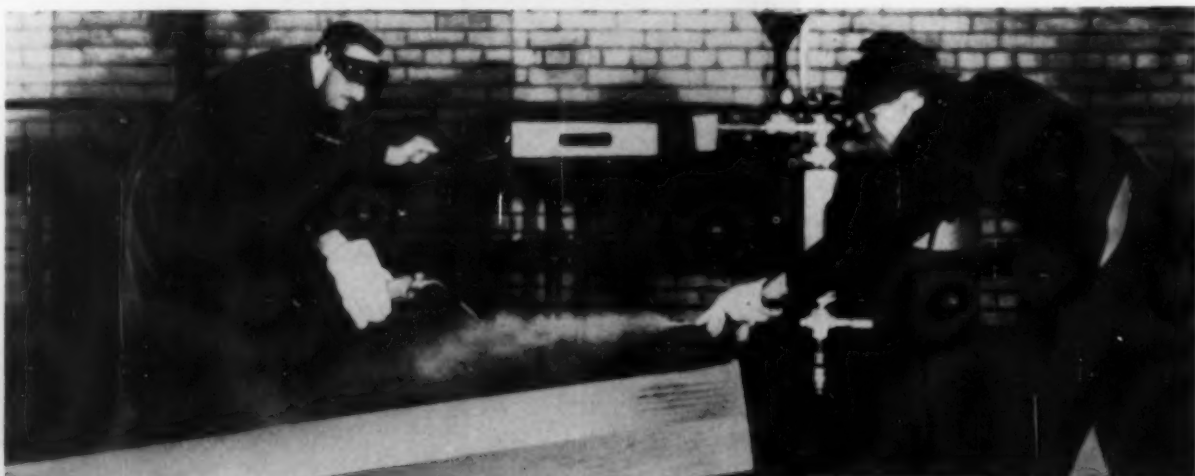
where there's electrical power . . . there's **OKONITE CABLE**

First low-cost

Flame tests prove fire-resistant properties of this hydraulic oil



Dramatic photo above shows flammability of conventional hydraulic oil.



Not so dramatic, but... see how Shell 3XF Mine Fluid resists flame,

Photos courtesy: U. S. Bureau of Mines

SHELL 3XF

fire-resistant mine fluid

**Shell 3XF Mine Fluid has been tested
by U. S. Bureau of Mines and is now in use**

Now—for the first time in mining history—an inexpensive, fire-resistant emulsion-type hydraulic fluid is available for mine equipment use—Shell 3XF Mine Fluid.

NO MAJOR MODIFICATION OF EQUIPMENT IS NECESSARY—Shell 3XF* is a direct replacement for ordinary hydraulic oils now in service.

CONVENIENT TO USE—Shell 3XF Mine Fluid, furnished as a concentrate, is mixed with water to prepare the emulsion *at the mine location*.

PROOF OF ITS FIRE-RESISTANT QUALITIES—In addition to recommending the use of fire-

resistant hydraulic fluids in mining machinery, the Bureau of Mines has evaluated Shell 3XF Mine Fluid using test methods that determine fire-resistant properties, and accepted it for Mine evaluation, pending the establishment of a Bureau approval schedule.

FOR COMPLETE INFORMATION on Shell 3XF Mine Fluid, write or call Shell Oil Company, 50 West 50th Street, New York 20, New York, or 100 Bush Street, San Francisco 6, California. In Canada: Shell Oil Company of Canada, Limited, 505 University Avenue, Toronto 2, Ontario.

*Trademark

SEE IT DEMONSTRATED at the Shell Booth
at the Coal Show in Cleveland May 11-14

MINE FLUID





31" HIGH PORTABLE UNDERGROUND TRANSFORMERS

100-225 & 300 KVA

*Custom Built
to your needs*

Photograph illustrates 225 KVA unit
— 4160/480 Volt with oil filled primary
cutout, grounding resistor and circuit
breaker in secondary circuit.

**We offer standard or special
Underground Portable Trans-
former Units to include all
special features required.**

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ENSIGN

ELECTRIC AND

MANUFACTURING CO.

914 Adams Avenue



Huntington 4, W. Va.

Utilization (Continued)

The Food and Drug Administration announced recently that it would order the removal from the market of seventeen coal-tar colors used principally in lipstick.

This action followed 2 yr of tests that proved seven of the banned colors had caused "definite injury" when ingested by animals. Ten other colors were so similar in chemical composition to the tested colors that they were also ruled off the cosmetic market.

The Kammer power plant of the American Electric Power System is reported to be operating on a full scale.

The first two units of the \$91-million plant went into service in 1958 and the third and final 225,000-kw generating unit began recently. Units 1 and 2 are owned by the Ormet Corp., a joint subsidiary of Olin Mathieson Chemical Corp. and Revere Copper & Brass, Inc., and provide power to Ormet's nearby new aluminum operation at Clarington, Ohio. Unit 3 is owned by the Ohio Power Co. of A.E.P. System, which operates the entire plant. Coal requirements of the new plant, to come from an adjacent major new deep mine opened by Consolidation Coal Co., are expected to be about 1,800,000 tons a year.

Dr. C. V. Riley, Kent State University biologist, has been checking chemical makeup of a man-made lake in the coal striplands of Mahoning County, Ohio.

His tests will show whether or not fish can be stocked in the lake and if so, what types of fish will be able to live best in the environment.

Bituminous Output

YEAR TO DATE PRODUCTION

April 18, 1959 122,825,000
April 19, 1958 121,792,000
1959 output 0.8% ahead of 1958.
A month earlier output was 2.9% behind 1958.

April 18, 1959 8,055,000
April 19, 1958 7,172,000

Anthracite Output

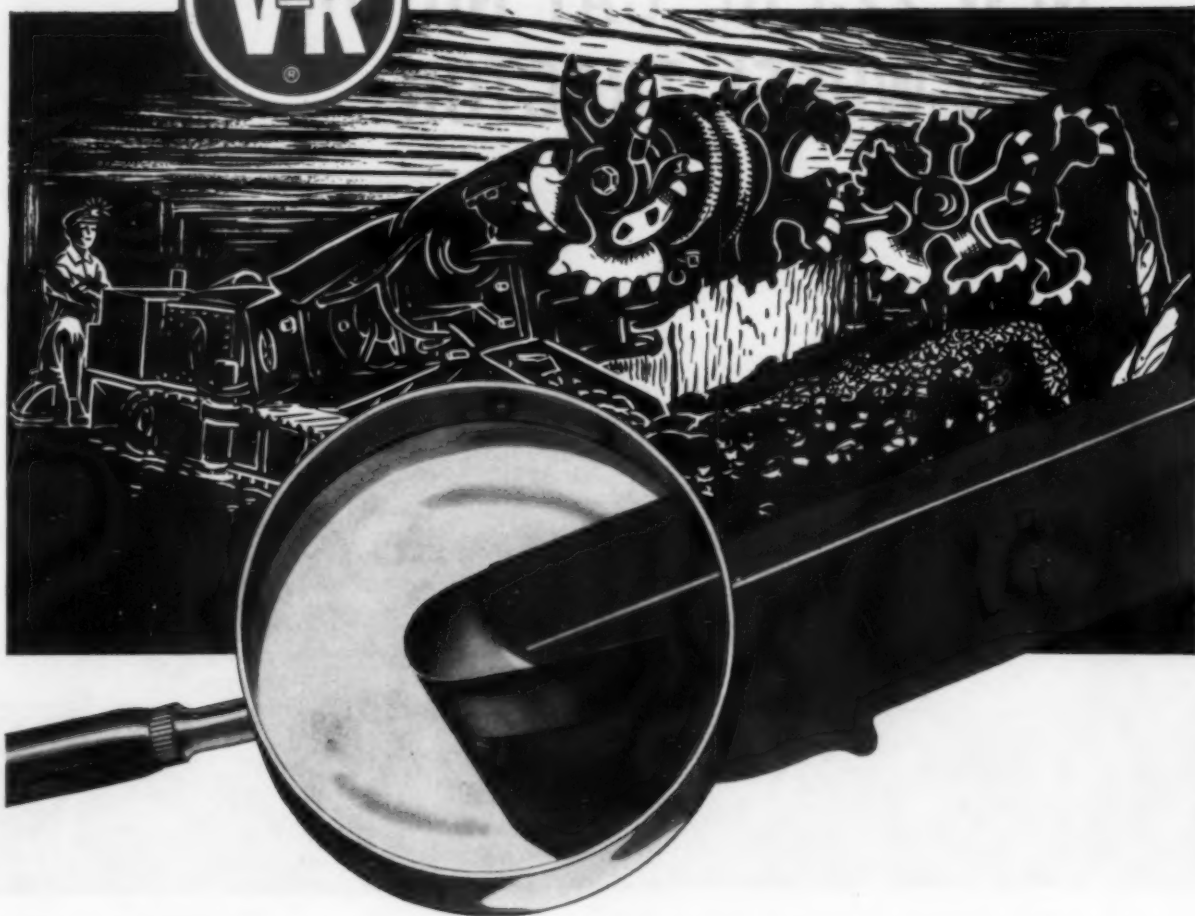
YEAR TO DATE PRODUCTION

April 18, 1959 6,285,000
April 19, 1958 6,463,000
1959 output 2.8% behind 1958.
A month earlier output was 3.1% behind 1958.

April 18, 1959 363,000
April 19, 1958 390,000



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This new No. 619 Series B represents a major breakthrough in two-wheel tractor-scraper design. It is the first and only broad application two-wheel machine that combines two-wheel traction with four-wheel speed and roadability. It also affords new unit construction and timesaving accessibility never before built into this type of rig.

The No. 619's new turbocharged engine delivers 225 HP and a torque rise of 20% — for fast acceleration. With a top speed of 30.2 MPH, the No. 619 can really run — and run under conditions that slow down other make two-wheel rigs.

That's because of its roadability. Advanced Caterpillar design has achieved a tractor-scraper balance resulting in rides that "smooth out" to an amazing degree. This balance permits higher speeds for more cycles per day and less operator fatigue.

With all this, new hydraulic steering makes the No. 619 extremely easy to maneuver, yet retains that important "feel of the road" touch. Design permits full 90° turns with a turning diameter of 30 feet.

As for unit construction and accessibility, here's one example: A new swing-away dash allows ready access to the starting engine, air compressor and hydraulic pump. Another example: By removing six capscrews in the planet carrier cover, each axle can be removed from the tractor. The planetaries are interchangeable between sides.

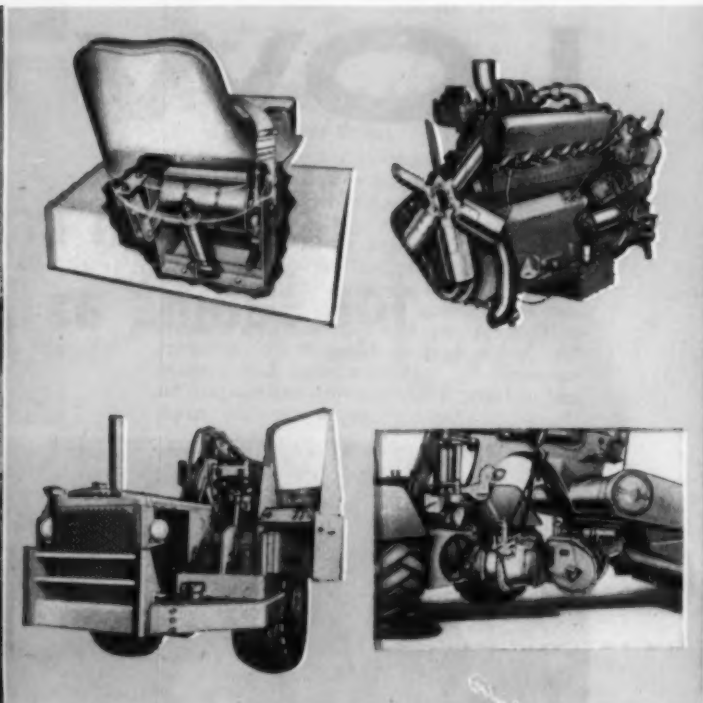
Like all achievements of Caterpillar's Project Paydirt, the No. 619-No. 442 unit has been thoroughly tested. Four years of on-the-job operation prove this: This new "all-job" machine will set new performance records on a broad range of applications.

How much does this mean to you profit-wise? Of course, that depends on your jobs. But this is certain — there's nothing like the new No. 619-No. 442 in the field today. Get the complete facts about it from your Caterpillar Dealer, who backs you with round-the-clock service and parts you can trust. Ask for a demonstration. See for yourself how it can step up production and profits on a wide range of applications.

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NEW TORSIONFLEX SEAT. New seat provides "highway" ride on off-highway conditions. Helps conserve operator's energy, lessens his fatigue, enables him to do more work per shift. One of many Caterpillar developments.

NEW TURBOCHARGED CAT ENGINE. Designed to meet the specific requirements of the No. 619. Develops 225 HP and a full 20% torque rise—for fast acceleration from cut. Fuel system permits use of economy-type fuels.



NEW NO. 442 SERIES B LOWBOWL SCRAPER. Matched to the No. 619 for high production. Capacities: 14 cu. yd. struck and 18 cu. yd. heaped. Exclusive Caterpillar LOWBOWL design provides a faster loading rate with less resistance throughout the loading cycle. Also available for use with the No. 619 is the 25-ton-capacity Athey PR619 Rear Dump Trailer.

NEW SWING-AWAY DASH. Permits timesaving access to the starting engine, air compressor and hydraulic pump. Entire left side of engine can be exposed without having to disassemble any major components connected with dash.

NEW UNIT CONSTRUCTION. Offers unmatched accessibility for servicing. Transmission differential and cable control can be quickly removed as unit. Each axle can be pulled out by removing six cap-screws from planet carrier cover.

Additional facts about the No. 619-No. 442—Six-speed forward, two-speed reverse constant mesh transmission • Standard wide-base 26.5-25, 24-ply tires all around—optional tread and ply ratings available • Choice of in-seat gasoline starting or direct electric starting • New dry-type air cleaner • Fuel tank capacity—85 U. S. gallons • Shipping width—10 feet, 10 inches.

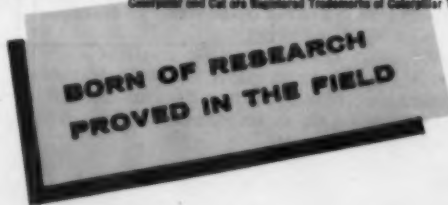
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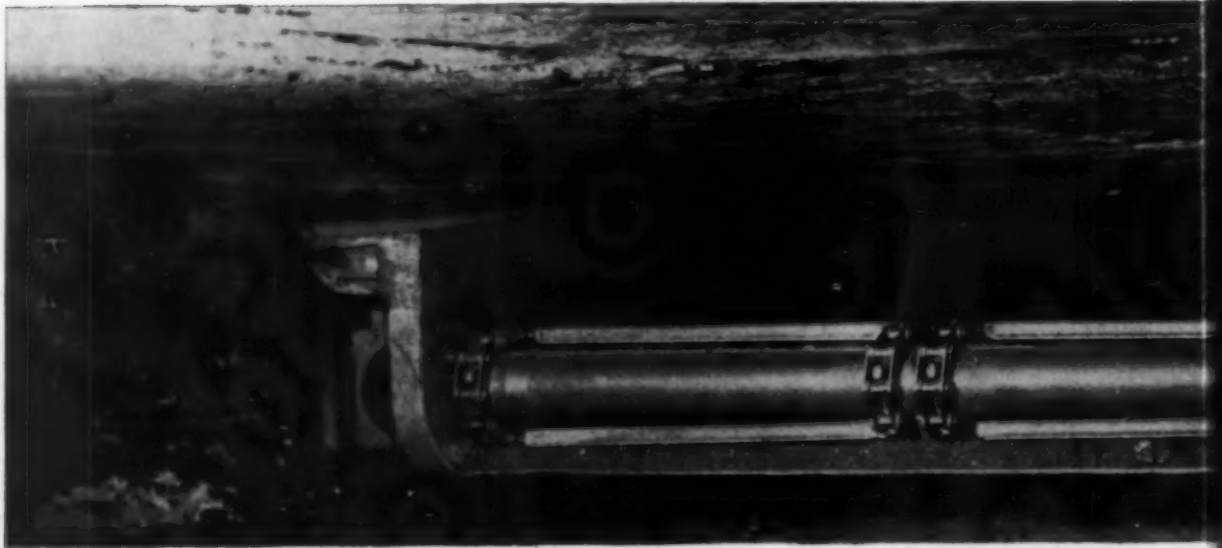
*** PROJECT PAYDIRT:**

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a high capacity team
for seams as low as 30 inches



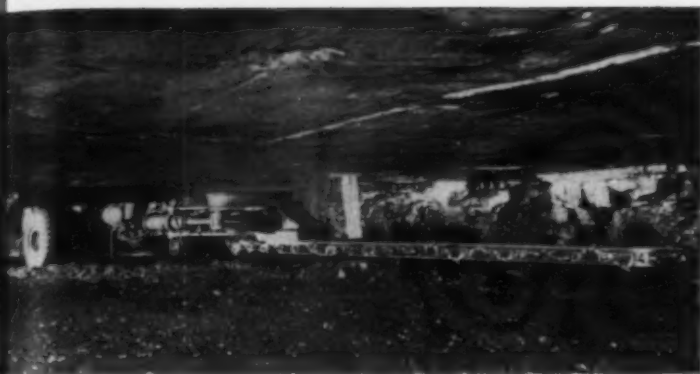
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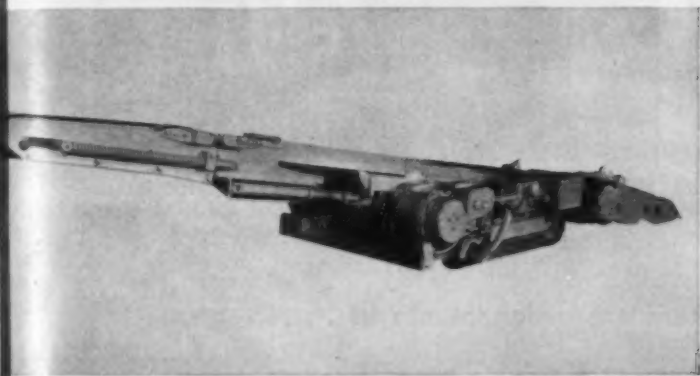
In Canada: Joy Manufacturing Company
(Canada) Limited, Galt, Ontario



1 JOY 12-RB CUTTER

overall height: 26 inches

In mines where shear cutting is not practical, the 12-RB bottom cutter reduces initial investment. The cutter makes a cut over 30 feet wide without repositioning the machine. More time at the face is spent in cutting because there's no backing off and moving in again. Cutter bar tilt and roll make up for uneven roof or bad floor . . . can cut around faults or hard spots. Only 26" high to work seams as low as 30 inches. Bottom cuts from 9¾" below the floor to 21" above. Available in 220 or 440 volts, 60 cycle AC and 250 or 500 volts DC. Where top cutting is best another model, the 12-RT is available.



2 JOY 14-BU-10 LOADER

overall height: 24 inches

This newest loader was designed to incorporate many features of Joy's high-capacity, high-seam loaders. To cram more capacity into a 24" high loader, the 14-BU-10 has a wider head and a 30" wide conveyor. The gathering arms are faster and the conveyor moves at 360 feet per minute. Like larger Joy loaders, the machine is mechanically simple—no shifting clutches, no 2-speed transmissions. All motors and parts requiring maintenance or inspection are mounted outside the frame for easy access.



3 JOY 18-SC SHUTTLE CAR

overall height: 27 inches

Only 27 inches high, the 18-SC hauls 4½ tons . . . twice the payload of any car of similar height. The secret is a unique 6-wheel design that adds two wheels at the center and reduces wheel sizes. The two center wheels provide traction, powered by separate 10 hp motors through a direct drive. There are no transmissions or torque converters to maintain.

The car is hinged to bend up and down in the middle. This permits it to follow rough bottom with rolls and dips. The absence of wheel wells gives the 18-SC a straight through conveyor 6 ft. wide and 27 ft. long . . . empties in 20 seconds.

AC

All Joy coal mining equipment is available with AC or DC.

WSW CL 9900-311



SAFETY PROGRAMS—J. H. Reitz, manager of safety for mines, Republic Steel Corp and Carl A. Donie, Fairview Collieries, retiring ICMI president.



MINING and MARKETING—W. G. Stockton (left), director of sales, Indiana Div., Walter Bledsoe & Co., and R. M. Biggs, electrical engineer, Viking Coal Corp.

Mine operations and personnel development are major themes as . . .

Indiana Deep-Miners Meet

THE WAYS AND MEANS and the achievements of Republic Steel's safety program, importance of personnel development, experience in operating a Colmol under difficult conditions and the 1959 marketing outlook for Indiana coals were top subjects presented by speakers at the one-day meeting of the Indiana Coal Mining Institute at Deming Hotel, Terre Haute, Ind., April 11. Nearly 150 members and guests of the institute attended the two technical sessions and the evening banquet, at which the featured speaker was Dr. Arthur E. Secord, Great Neck, N.Y., on the subject of "How to Tell What You Know." In an afternoon business session, officers for the coming year were elected as follows:

President: E. M. Cassidy, general superintendent, Snow Hill Coal Corp., Terre Haute, succeeding Carl A. Donie, superintendent of Minnehaha mine, Fairview Collieries Corp., Linton, Ind.

Vice Presidents: Ralph Whitman, superintendent, Ditney Hill mine, Ingle Coal Corp., Elberfeld, Ind.; Michael Kenek, pillar-line supervisor, Enoco Collieries, Inc., Bruceville, Ind., and W. A. Endicott, general superintendent, Fairview Collieries Corp., Brazil, Ind.

Ethel L. Morgan was reelected secretary-treasurer. Members of the executive board for 1959-60 are C. H. Hodgson, Mine Safety Appliances Co.; H. P. Roberts, C. F. Gharst Supply Co.; Charles Adams, Kennametal, Inc.; T. E. Davis, Jeffrey Mfg. Co.; Nathaniel



PERSONNEL DEVELOPMENT—W. L. Ketner, personnel administrator, Visking Co., Div. of Union Carbide Corp.

Kirk, Snow Hill Coal Corp.; Ray Biggs, Viking Coal Corp.; Placide Mayeur, Princeton Mining Co.; Reuben Tucker, Thunderbird Collieries Corp., and Mr. Donie.

Mr. Donie, the retiring president, presided at all sessions. Abstracts of papers are as follows:

Republic Steel's Mine Safety Program, by H. H. Reitz, manager of safety for mines, Republic Steel Corp., Cleveland, Ohio.

The overall company program provides for a Corporation General Safety Committee, a District General Safety Committee and a Department Safety Committee. The first of these committees is composed of the director of industrial relations, the manager of safety and all district or plant superintendents of industrial relations. Also included are director of plant protection and manager of workmen's compensation and social insurance. This committee directs all policy concerning safety, compensation, housekeeping, fire prevention and so on.

The district committee is composed of the district, plant or mine manager and his assistant, the superintendent of industrial relations and his assistant, safety and fire engineers and all department heads. This committee meets monthly to discuss all phases of safety and related activities, and to formulate plant policies with regard to the matters.

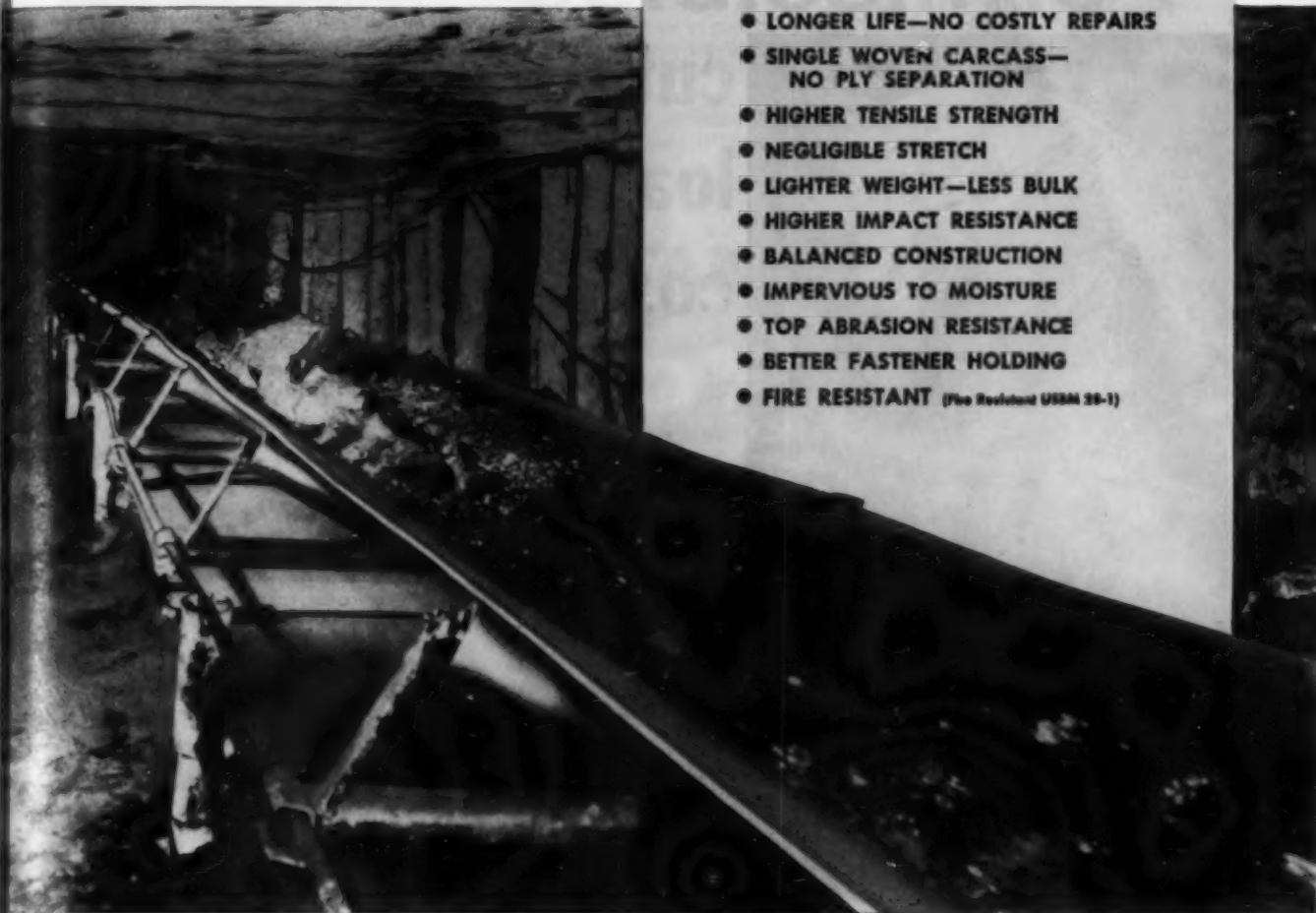
The departmental committee includes the superintendent of the department and his assistants, the safety supervisor and all department supervisors. The function of this committee is to promote safety education, to conduct inspections and to submit required reports. All the duties of all committees are

INDUSTRY MEETING— A Special COAL AGE Staff-Written Report

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- LONGER LIFE—NO COSTLY REPAIRS
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cut
loading
costs



Loading costs and cleaning expense are important factors in the profit picture of many deep mines. And, they are factors that can be closely controlled through use of the right permissible dynamites.

Austin produces permissibles which solve virtually every problem connected with production of coal. They are available in speeds and strengths that meet such varying conditions as heavy binders, hard rock, thin seams, excessive water, etc.

Your Austin representative will gladly survey your present operation and show you how the correct type of permissible can save you time and money. Call him today or write Austin Powder Company in Cleveland.



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explosives ♦ low grade ammonium nitrates ♦ primers ♦ blasting supplies
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covered in a comprehensive manual published by the corporation.

To provide stimulus to the long-range program, Republic instituted Operation CAP in 1958 and Operation CAP Alert in 1959. The CAP means Contribution to Accident Prevention. These campaigns permit the setting of interim goals and periodic rating of performance.

Definite progress has been noted. The coal and ore mines operated through 1958 without a fatality, during a total exposure of 4,649,226 man-hr. The company's Republic mine in eastern Kentucky won the Sentinels of Safety award for bituminous mines in the 1957 National Safety Competition. The corporation's safety program now has been extended to include discussion of off-the-job accident prevention.

Importance of Personnel Development in Your Business, by W. L. Ketner, personnel administrator, Visking Co., Div. of Union Carbide Corp., Terre Haute, Ind.

The basic problems of personnel development are similar in all industries. People are the most important assets of any enterprise. The personnel development program of a business enterprise should be vitally concerned with raising the potential of these people.

Promotion from within is a basic policy of Visking and Union Carbide. The senior man having the required ability for the job is given first consideration, other things equal. Furthermore, in developing future leaders there can be no secrets between leader and assistant.

Careful planning in recruiting also is a necessity. One company decided to employ only young men. Now it foresees the day when the ranks of leadership will be decimated in the space of three years through retirement of these recruits.

Performance reviews also are a vital element in developing employees. Every man wants to know where he stands. Visking has a performance rating program which forces supervisors to perform the rating of subordinates on the anniversary of their employment and at other definite intervals.

Experience With Continuous Mining Under Difficult Seam Conditions, by Ray Biggs, electrical engineer, Viking Coal Corp., Terre Haute, Ind.

A crew using an AC-powered Colmol produced 37.9 tons per face man per shift during the months of January and February, 1959, as compared with 27.4 tons per face man in conventional mining under the same conditions during the same period. The work is complicated by the fact that two lower seams have been worked under the Indiana No. 5, the present horizon of operations. Strata are badly broken, and the No. 5

seam is badly displaced in some areas. Furthermore, the seam is underlaid by a layer of soft fireclay up to 2 ft thick. Numerous pyrite inclusions invade the seam, there is a persistent streak near the bottom and large pyritic boulders project from the roof. The full seam ranges from 42 to 52 in in thickness. The practice at Viking is to leave 3 or 4 in of bottom coal to keep the machine out of the fireclay, and the same thickness of top coal is left to permit the Colmol to operate under the boulders which project from the roof. Leaving the roof coal has made a substantial contribution to better roof control, since there is no air-slacking and the lack of shooting eliminates roof disturbance.

Size consist is not critical because all of Viking's coal is transported directly to a nearby power plant. The machine produces coal in the 4x0 range and this is reduced to 1½x0 in a rotary breaker before it is sent to the plant.

Basic unit equipment, in addition to the Colmol, includes a 14-BU loading machine, two 6-SC shuttle cars, a 36-in Goodman panel belt conveyor and a Brown Faryo carspotter. The dayshift crew of 10 men includes a Colmol operator and a helper, a pickup loader operator, two shuttle-car operators, a cleanup man, a timberman, a loading-point man, an electrician and a section foreman. The second shift crew of 7½ men includes a Colmol operator and a helper, a pickup loader operator, two shuttle-car operators, one-half the time of an electrician, a loading point man and a section foreman.

A feature article describing Viking's continuous mining appears in the July, 1958, issue of *Coal Age*, beginning on p. 86.

The Marketing Outlook in Indiana Coal for 1959, by W. G. Stockton, director of sales, Walter Bledsoe & Co., Indiana Div., Terre Haute, Ind.

Two major factors affecting the price of Indiana's coal are (1) supply and demand and (2) competition from oil and gas and from coal originating in other areas. As long as we have greater productive capacity than demand, the supply exerts downward pressure on the price.

Foreign oil on the Eastern Seaboard and dump gas in the Midwest, along with the "natural" competition from oil and gas, provide a further squeeze on Indiana coal prices. One effect is that when eastern coal companies lose out to residual oils in seaboard power plants, this coal is liberated to compete with coal from Indiana, Illinois and western Kentucky. This, too, exerts downward pressure on price.

At the same time, any loss in coal business severely depresses the income of the coal-hauling railroads, and in

many instances their only recourse has been to increase freight rates. This creates upward pressure on costs of distribution.

In an effort to solve marketing problems like these and others, the Indiana Coal Association until recently had the services of Julian Tobey Jr. to provide engineering services to customers using Indiana coals. This work will be continued under new leadership. BCI will continue the work on a national scale from field centers, including one at Indianapolis. The Automatic Solid Fuels

Equipment Co. offers and promotes the use of all kinds of automatic equipment to compete with the packaged units long offered by competitive-fuel dealers. BCR has developed the Coal-Pak in sizes up to 300 hp to provide another marketing boost for coal. Furthermore, reasonable adjustments by the railroads give promise of relief to coal.

The upshot is that Indiana producers may see a 10% increase in 1959 production over 1958. That would mean an increase of 1½ million tons from Indiana mines.

STAMLER HAS 50% MORE CAR SPOTTERS IN USE than ANY OTHER MAKE

... and STAMLER has never built a failure! EVERY SINGLE STAMLER CAR SPOTTER EVER BUILT is still in service . . . still loading coal at the LOWEST POSSIBLE COST PER TON . . . and still operating at a Parts-and-Maintenance Cost SO LOW that it is practically impossible to figure per 100,000 tons. No other car spotter can make this statement because no other car spotter can come near equalling STAMLER'S performance. Play

safe! Don't settle for less than the best! Get a STAMLER—the Number ONE car spotter!



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NEW BATTERY PLATE CONSTRUCTION

Unique new double-sleeve, multi-tube positive plate construction permits greater volume of active material per tube and greater accessibility of electrolyte to the material — providing greater capacity for brighter, better light with no increase in plate size. Long battery life with increased resistance to vibration and hard use are plus advantages.



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A PERFECT SPOT at your fingertips — either filament

A finger-turn of the switch knob lights either filament of the powerful equal-filament bulb—and at the same time achieves a perfect, brilliant spot! No tools, no fuss or tinkering. Anyone who can turn a switch can focus an ideal spot with WHEAT instantly!

A MAJOR ADVANCE in better light for the miner!

THE WHEAT National MODEL MINER'S ELECTRIC CAP LAMP

In a single step, WHEAT moves out front in better light, greater utility, top service for the worker underground! The WHEAT *National* Electric Cap Lamp incorporates advances in battery, bulb and focussing beyond comparison in the field today—retains every factor of dependability, simplicity and ease of maintenance that have made WHEAT the leader in sales increase for the past decade. See your National Mine man now, and talk WHEAT NATIONAL for its very good reasons!

30% MORE LIGHT at no increase in weight

Advanced, exclusive new battery construction joins with efficient new krypton-filled bulb to achieve unrivalled light output in a miner's electric cap lamp today . . . 30% more light than even the high-powered Wheat Forty-niner! For the *most* light for the miner throughout the working shift, specify WHEAT NATIONAL.

TWO WORKING FILAMENTS in Krypton gas-filled bulb

Each of the two identical filaments in the new Wheat krypton-filled bulb is a full-power working filament. If one burns out, the other is instantly available at equal high brightness—and is focussed instantly to an equal perfect spot. Only WHEAT NATIONAL offers this operating ease!



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For extra-rugged service



an extra-rugged bond



USS Tigerweld BF-12



Look at this photo and you will see why the Tigerweld BF-12 is so durable. The raised shoulders on each of the terminals form V-shaped troughs with the web of the rail. Into these troughs you can lay extra metal to guarantee a permanent weld.

The terminals and the strand are connected by the familiar Tigerweld butt-weld which makes the joint stronger than the strand itself. The heat of welding cannot harm the joint. The entire bond has the strength to stand up under heavy stresses,

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Easy to install. A couple of hammer blows on the terminals will hold it to the track while you weld. No clamps are needed. You save time . . . you save expense with installation crews.



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Devoted to the Operating, Technical and Business Problems of
the Coal-Mining Industry

**COAL
AGE**

MAY, 1959

IVAN A. GIVEN, EDITOR

Industry of Distinction

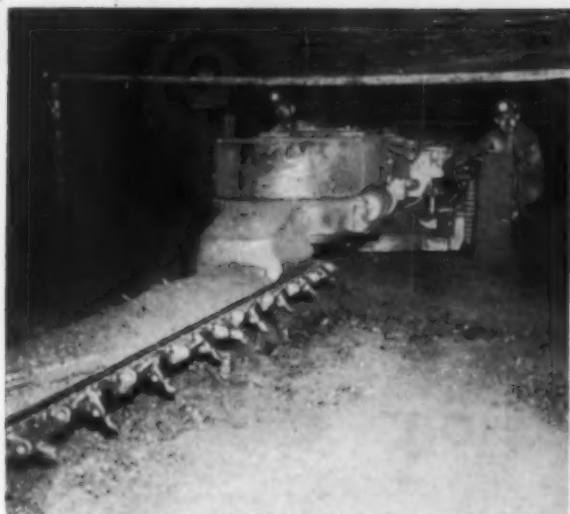
The position the bituminous industry finds itself in today can be literally described as "unique," meaning, according to Webster, "single; sole": also "being without a like or equal." It has earned that distinction in the past decade in particular and clinched it on April 1 when it made effective the last 80c of the latest \$2 wage raise and at the same time instituted price reductions of 25c per ton almost across the board. No other major industry can point to such a record, in these piping inflation days.

Though the combination of increased cost and reduced prices can mean some temporary difficulties, the outcome will represent a major advance for the industry. In other words, it is good—in fact, very good—that coal has progressed to the point where it can take such a step in the sure knowledge that it will contribute to a more-solid position and greater progress in the near as well as the farther future.

Coal always has insisted that it wants to provide the maximum in value and service, that with an equal opportunity it is able, and that it is doing so. Now, its point has been made as clear as it possibly could be. In large part through its efforts, the rising tide of oil imports has been arrested—at least for the time being—and it is responding by giving consumers a break in prices. Thus, it is practicing industrial statesmanship of the highest order.

Coal is in position, as noted earlier, to practice this industrial statesmanship with relatively little fear of adverse consequences. This is a result of the heavy expenditures of money for machines to increase productivity—plus, of course, engineering, managerial and supervisory talent to match. The ultimate is still a measurable distance away, so it is quite safe to assume that not too long after next January 1st—if not earlier—coal will have marked up another advance sufficient to offset this last double dose of wage increase and price cut.

Can coal keep up the process? It would be nice, in a way, if it did not have to, but it is perhaps even better that it has the leeway that still remains between the average tons per man and what the properties using the latest in equipment are getting, not to mention that between today's average and what the farther future will bring in the way of productivity. Thus, coal can continue to be an industry of distinction and at the same time enjoy continued growth and a rising level of prosperity.



RUBBER-TIRED machine with 9-ft bar undercuts the 46-in coal bed. Two men cut and drill 16 places per shift.



HYDRAULICALLY DRIVEN unit powered from cutting machine drills two rows of holes above 2- to 5-in parting.



VITAL to successful operation is this new plant featuring dense-media and feldspar-jig washing, centrifugal drying and filtering. Plant upgrades raw coal with 50% reject to product with 8 to 8½% ash, 1.7% sulphur and 3 to 3½% total moisture.

Badger Coal's Modern Preparation

Dense-media washer and feldspar jig solve tough washing problem at new all-belt mine tapping Kittanning coal in West Virginia. Face crews mine up to 44 tons of raw coal per man-shift from 46-in seam.

By Alfred E. Flowers
Associate Editor, Coal Age

MODERN preparation facilities that upgrade to a quality product a coal previously considered too dirty to

mine, plus efficient underground mining, are the foundations for successful operation at the No. 10 mine of the Badger Coal Co., Philippi, W. Va.

Badger's preparation plant takes a raw feed containing 50% reject by weight and 18 to 26% ash and up-

grades it to 8 to 8½% ash, 1.7% sulphur, 13,700 Btu as received and 2,700 F fusion temperature. Total moisture in the coal at destination is 3 to 3½%.

Coal flows to the preparation plant over a network of belt conveyors receiving coal from three underground mining sections producing on a two-shift schedule. Employing conventional off-track mining equipment, 11- and 12-man face crews mine up to 44 tons of raw coal per man-shift from the 46-in Upper Kittanning coal seam.



COMPRESSED AIR at 8,500 psi breaks coal, making a minimum of fines. Two compressors on surface provide air.



HIGH-CAPACITY crawler-mounted machine loads coal into shuttle cars for delivery to panel belt conveyor.



ONE MAN controls operation of the 250-tph preparation plant from centrally located panelboard. Circuit breakers for plant units are shown at right.



FINAL DRYING of fine coal to 3¼% moisture is achieved in centrifuges.

Undergirds Productive Mining

Planning the Mine

Badger management became interested in the Upper Kittanning coal as the company's reserves in the Redstone seam became depleted. The company had been mining in northern West Virginia since 1949 and wanted to remain in that field but no attractive reserves of Redstone were available. One of the few possible sources of new coal reserves was a 10,000-acre tract of Upper Kittanning coal near Philippi, which in the past had been considered un-

minable because of the high percentage of impurities in the seam and the difficult washing problem it presented. For example, the raw coal contained 18 to 26% ash and the 1.45 float product, 18% ash. But several basic properties of the clean product—high fusion, low sulphur and high Btus—made the coal attractive, particularly since it was the only high-fusion, low-sulphur coal in the area. It also offered the advantage of being close to the eastern utility market.

A thorough study of the coal's characteristics, mining conditions and

preparation possibilities indicated that the seam could be mined profitably. For example, the coal is overlain by hard sandstone and rests on a hard shale floor. Furthermore, clean-coal analyses indicated that a product with low sulphur, high Btus and high fusion could be prepared.

Because of the desirable quality of the clean coal, Badger management decided to have a series of washability studies made by Commercial Testing & Engineering Co. on the basis of test results, Commercial Testing recommended a dense-media



PRESIDENT R. K. Bogert Jr. (right) and Charles Morgan, secretary-treasurer, co-ordinate company operation.



DISCUSSING mining plans are Harold Cochran (left), superintendent, and J. M. Cannon, vice president of operations.



MAINTENANCE SUPERINTENDENT W. J. Keener checks power at capacitors near pump. Power factor is 99.6%.



PORTABLE GRIZZLY at shuttle car unloading point prevents large lumps from passing onto belt. Belt troubles are minimized.



BATTERY-POWERED tractor speeds supplying at the face and provides transportation for maintenance men and supervisors.



UNDERGROUND network of 30-in belt conveyors carries coal from the mining sections to the surface.

system for preparing the plus ¼-in sizes.

Badger then took the washability data to McNally Pittsburg, which designed a plant employing a McNally-Tromp dense-media washer with an automatic density control for handling the difficult washing problem. A contract was signed for construction of a 250-tph plant in 1956 and in April, 1957, the plant went into operation.

Shortly after the plant went on stream an unforeseen problem arose that immediately prompted Badger management to make plans to add fine-coal cleaning equipment. This problem was degradation of the high-ash larger sizes in the storage bin and on the raw-coal screens. This resulted in increasing the ash content of the ¼x0 to 18%, up 10% from the expected 8. To solve this new problem, Badger again called on McNally Pittsburg engineers, who recommended a feldspar fine-coal jig for cleaning the ¼x0 coal and a CMI drier for dewatering. A contract was signed for the fine-coal addition and on Nov. 7, 1957, the feldspar jig and drier began processing the ¼x0. The fine-coal jig is the second feldspar unit to be installed in the United States.

A second addition was made to the cleaning plant in 1958 when two Dorr-Oliver vacuum filters were installed to clarify water for reuse and to prolong the life of the settling pond. The filters were cut into the preparation circuit Sept. 22, 1958, and are now removing 14 tph of solids from the water. The filter cake is sent to the refuse bin.

The Republic Coal & Coke Co., Chicago, Ill., is exclusive sales agent.

Badger's No. 10 mine taps the Upper Kittanning coal with a drift opening 1 mi west of Philippi and approximately 125 ft above stream level. While the preparation plant was taking form, underground mining crews advanced five headings as fast as possible to open territory for full production when the cleaning plant was completed. The coal was hand-picked until the new preparation plant went into operation.

Mining Plan and Equipment

The mining plan is designed to recover 60% of the coal because the company wants to protect another minable seam of coal which lies only

Badger Officials

R. K. Bogert Jr., President
Mrs. R. K. Bogert, Vice President
J. M. Cannon, Vice President,
Operations
Charles Morgan, Secretary-Treasurer
Harold Cochran, Underground
Superintendent
W. J. Kenner, Maintenance
Superintendent

Badger Preparation Goal

Moisture.....	3 to 3½%
Ash.....	8 to 8½%
Btus, as received.....	13,700
Fusion.....	2,700 F
Sulphur.....	1.7%
Volatile matter.....	33 to 36%
Fixed carbon.....	55%

40 ft under present workings. All production comes from three sections employing conventional off-track equipment. Two producing units work in the No. 3 East panel, one mining coal from five headings and the other advancing rooms and splitting pillars off one side of the entry.

Each of these sections is equipped with a Joy Super 14-BU loader, 11-RU cutter with Schroeder or Jeffrey hydraulic coal drill and two 6 SC shuttle cars. An 11-man crew assigned to each section includes the following men: loader operator, two cutters and drillers, two shuttle-car operators, shotfirer, timberman, cleanup man, grizzly man, who breaks large lumps on a grizzly at the loading point, and foreman.

Each crew cuts, prepares and loads an average of 16 cuts, or 445 tons, from the 46-in seam. All working places are driven 18 ft wide and breakthroughs are cut 90 deg. Headings, rooms and breakthroughs are driven on 60-ft centers, thus producing uniform pillars. After rooms are driven 300 ft deep the room pillars are split.

In the third producing section the company has a double-loader section which currently is advancing seven headings on 60-ft centers. Breakthroughs also are spaced 60 ft apart. Equipment includes two Joy 8-BU loaders, two 6 SC shuttle cars, Sullivan 7AU cutter mounted on rubber tires, and Jeffrey or Schroeder hydraulic coal drill. The 12-man crew includes two loader operators, two cutters and drillers, two shuttle-car operators, shotfirer, timberman, cleanup man, grizzly man and fore-

man. Average production is 13 cuts per shift.

Each of the two loaders is assigned three outside headings, coal in the middle heading being loaded by whichever machine happens to be loading in the more favorable conditions or loading faster. By using the middle heading as an alternate loading place, the company keeps the headings advancing evenly.

Coal is undercut to a depth of 9 ft and is broken with Airdox at 8,500 psi in the No. 3 East section. Five 2¼-in holes, in two rows, are drilled for each cut of coal. Both rows are drilled above the 2- to 5-in parting in the coal seam. Three equally spaced holes starting 12 in from each rib are drilled 8 in down from the roof in the upper row. The two holes in the lower row are drilled 7 ft from each rib and several inches above the coal parting. Coal drills are equipped with Kennametal and Marathon augers and Vascoloy and Kennametal carbide bits. Coal in the No. 2 East section is broken with Hercules and duPont powder.

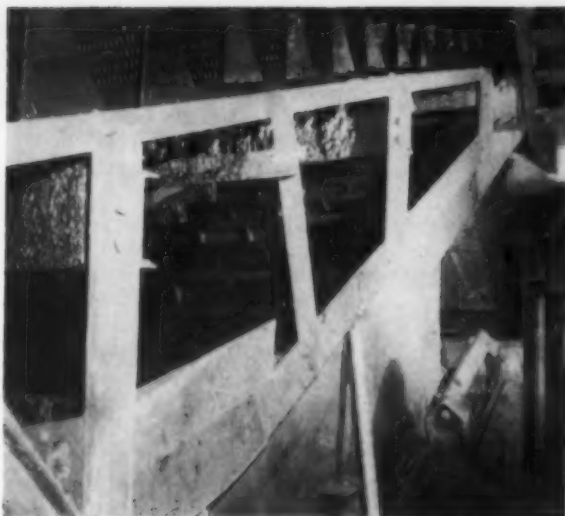
Rooms are driven 18 ft wide to a depth of 300 ft. Breakthroughs, cut every 60 ft at 90 deg, divide the coal into 42-ft-square blocks. These blocks are split on retreat so that over-all recovery will be 60 to 70%.

The immediate roof is strong and generally is supported with straight posts. Wood crossbars are added if additional support is needed. In permanent headings, such as beltways and supplyways, two rows of straight timbers are set along each side of the opening as a precautionary measure.

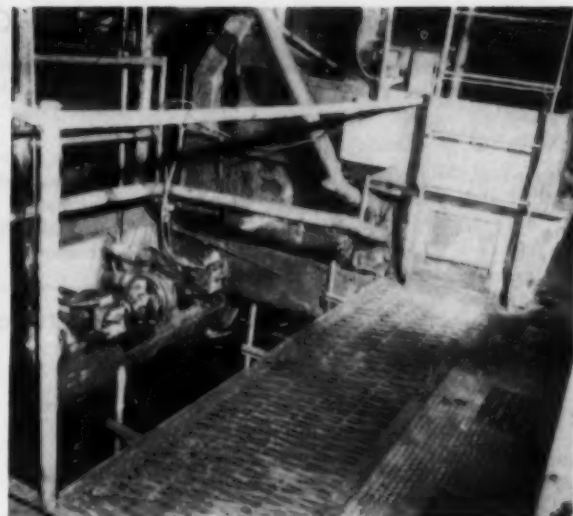
All-Belt Haulage

Shuttle cars discharge onto a portable grizzly which straddles the belt at the tailpiece. Any lumps that do not fall through the 14-in openings in the grizzly are broken by the grizzly man. The company reports that the grizzly pays off not only in less spillage along the belt but also in elimination of belt damage caused by lumps rolling off and coming to rest in a position that could cause belt damage.

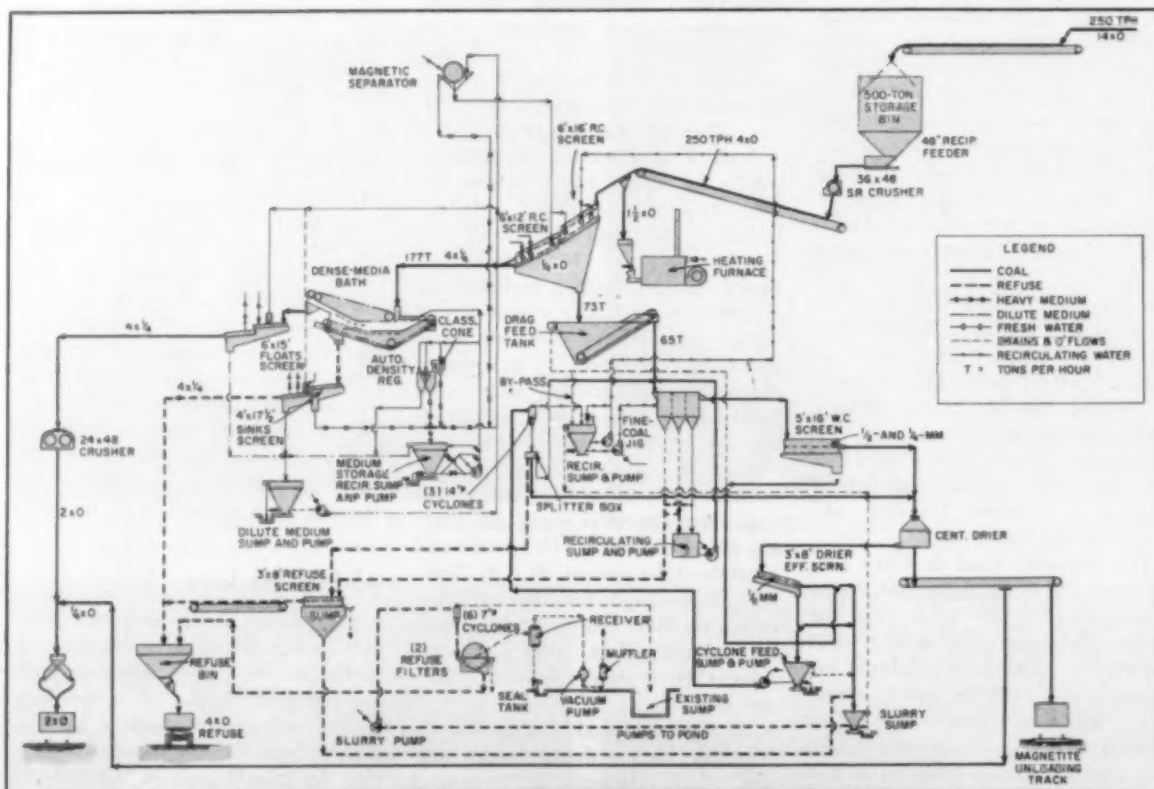
The No. 2 East entry is equipped with a conventional Joy 30-in belt and the No. 3 East entry has a Joy 30-in Limberoller unit. These two conveyors discharge onto a Joy 30-in belt in the Main North entry. To



DENSE-MEDIA WASHER with automatic density control processes 4x¼ previously separated from ¾x0 on vibrators.



FELDSPAR JIG, second to be installed in the United States, receives ¾x0 feed directly from drag tank.



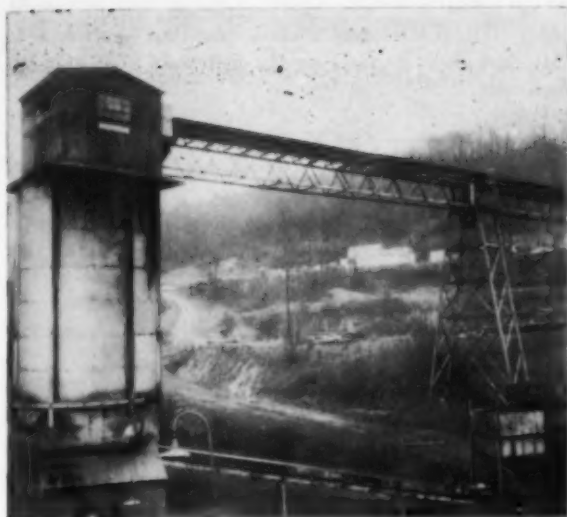
HOW COAL FLOWS at the Badger Coal No. 10 preparation plant.

prevent overloading of the Main North belt, a cut-out, or hesitator, switch is incorporated in the control circuit for the outby No. 2 East belt. It works like this. When the main North belt is fully loaded it presses down on a roller mounted on one end of a pivoted arm. The other end

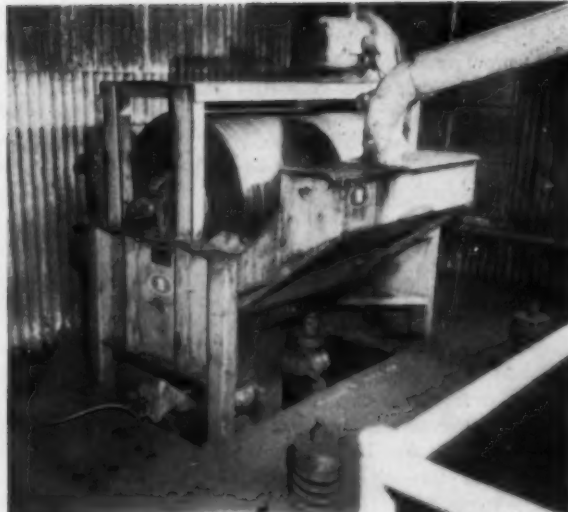
of the arm has a mercury switch mounted on it in such a way that it opens or closes the electric circuit controlling the outby belt. It stops the outby panel belt only when it, too, is carrying coal.

If the outby belt is running empty at the moment a full belt is moving

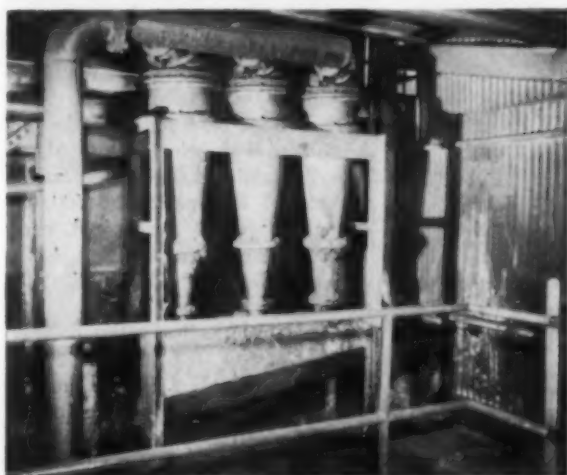
by, the cut-out switch does not open the circuit because no additional coal is flowing onto the fully loaded main belt. This arrangement makes it possible for a shuttle car to discharge onto an empty belt and the coal to be carried to the mouth of the panel before the belt is stopped.



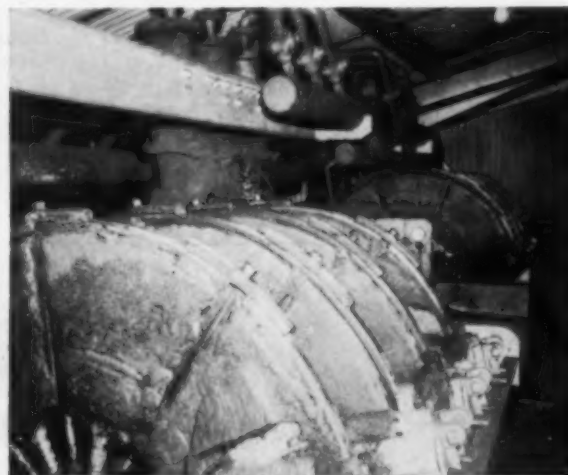
STORAGE SILO, holding 500 tons, prevents interruption in mine production from stopping the preparation plant.



MAGNETIC SEPARATOR recovers magnetite for reuse in dense-media washer. Plant uses 1 lb of magnetite per ton.



CYCLONES concentrate ultrafines in drier effluent for final dewatering on vibrator. Cyclone effluent is reused.



DISK FILTERS remove solids from drier effluent and underflow of refuse dewatering screens. Filtering cake joins refuse.

The Main North belt discharges onto a Hewitt-Robins 30-in belt that carries the coal 1,700 ft to the outside where another Hewitt-Robins unit takes over and conveys the coal 500 ft horizontally to a 500-ton steel storage silo. Underground conveyors are equipped with Hewitt-Robins, Boston Woven Hose, Goodall and U. S. Rubber belting joined with Minet splices. Slippage protection is provided by Ensign controls.

Preparation

A 48-in reciprocating feeder under the storage silo delivers raw coal to a McNally Pittsburg 36x48 single-roll crusher that reduces it to 4x0.

The crushed product flows to a Hewitt-Robins 30-in conveyor equipped with Quaker belt and is carried to the top of the plant. There it flows onto two Allis Chalmers double-deck vibrators in tandem and is wet screened into 4x¼ and ¼x0 sizes. The bottom deck of each vibrator is stainless steel, ¼-in mesh, and the upper deck is Wedge Wire stainless steel, ¼-in S-wire. The S-wire screen is used to prevent long, thin pieces from passing through with the ¼x0.

Dense-Media Washing

The raw 4x¼ flows to a McNally Tromp dense-media bath equipped with an automatic density regulator.

Clean 4x¼ discharges onto a 6x15-ft shaking dewatering screen that removes magnetite and water. The clean coal drops from the end of the screen into a McNally Pittsburg 24x28 Gearmatic crusher that breaks it to 2x0. It then passes to railroad cars.

Refuse also flows to a shaking screen for dewatering and removal of magnetite. It then flows to a 15-ton refuse bin, from which it is carried to a disposal area by two White 10-ton trucks.

The magnetite and water from the clean coal and refuse screens flow to a dilute-medium sump where a McNally 4x6 centrifugal pump picks the mixture up and pushes it through

a pipeline to a Dings magnetic separator. Concentrated magnetite is directed to a medium-storage tank for reuse in the Tromp bath. A Hazleton 10-in unit recirculates the magnetite to the dense-medium washer. Magnetite consumption is 1 lb per ton.

Effluent from the magnetic separator is recovered and reused for wet spraying on raw-coal vibrators.

Feldspar Jig Cleans Fines

The raw $\frac{1}{4} \times 0$ is pushed into a drag feed tank which discharges directly into a McNally Pittsburg 3-cell feldspar fine-coal jig. This unit, as noted, is the second feldspar jig to be installed in the United States.

Clean $\frac{1}{4} \times 0$ passes to a 5x16-ft Allis Chalmers Low Head vibrator equipped with Wedge Wire $\frac{1}{2}$ - and $\frac{1}{4}$ -mm stainless-steel screen. The de-watered product is funneled to a CMI drier that reduces moisture content to 3%. Badger management reports that the low moisture content of the drier product is the result of low inherent moisture and the water-repellent nature of the coal. The dried coal drops onto a scraper con-

veyor that delivers it either to a separate loading track or mixes it with the crushed $4 \times \frac{1}{4}$.

Effluent from the CMI drier flows over a 3x8-ft Allis Chalmers Ripl-Flow vibrator equipped with $\frac{1}{2}$ -mm stainless-steel screen cloth. The over-product is delivered to a sump and then is pumped by a McNally 4x6 unit in series with an Allis Chalmers 4x5 pump to a battery of six 7-in cyclones feeding two Dorr-Oliver 4-ft disk filters. The filter cake drops onto a conveyor that carries it back to the refuse bin. The cyclone effluent flows to a sump and then is pumped 2,500 ft through Republic and Yardley 6-in plastic pipe by a Morris 5x6 unit to a settling pond.

Underflow from the $\frac{1}{4} \times 0$ clean coal vibrator and from the drier effluent screen collects in a sump from which it is pumped to a battery of three 16-in cyclones. Concentrated solids in the underflow may be sent to one of the following: (1) the filter circuit; (2) CMI drier feed or (3) the feldspar jig.

The preparation plant is operated by only four men as follows: plant operator, car dropper, truck driver, and

foreman. Two full-time maintenance men are employed on the third shift and a part-time mechanic is used on the first shift.

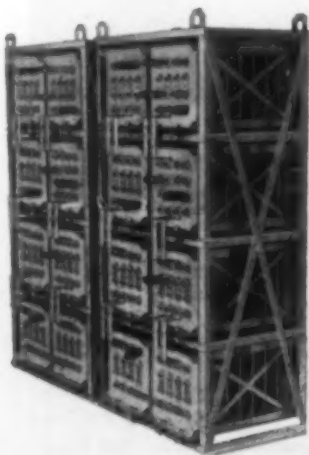
Power

Power is purchased from the West Penn Power Co. at 4,160 V. After passing through a metering station the power circuit is split into two branches. One branch leads to the company's outside substation supplying the underground equipment and the other leads to the plant.

A General Electric 500-kw m-g set converts the AC power to 250 V DC for powering mine units. The DC power is transmitted to mine workings by aluminum cables suspended in a 6-in borehole. Both positive and negative sides of the borehole circuit are made up of 1-, 599,000- and 795,000-cir mil cables.

The aluminum feeders terminate at a 1,500-amp cutout switch at the bottom of the borehole. From there a 1,000,000-cir mil copper circuit extends north and south in the No. 3 heading of the No. 1 North Mains. Branch circuits, 1,000,000-cir mil in the No. 3 East panel and 500,000-cir mil in No. 2 East panel, carry power to the mining areas. A 1,000-amp cutout switch is installed at the mouth of each panel so each may be isolated electrically without interrupting power to the other. The 4,160-V power line to the preparation plant terminates at a bank of three General Electric 100-kva transformers that reduce the voltage for plant operation. The plant has a total connected load of 460 hp.

Power factor at Badger No. 10 is maintained at 99.6%, well above the penalty value. This high value is the result of installing capacitors on a number of the larger motors in the preparation plant. Also, by careful regulation of excitation voltage on the m-g set, the company gets a leading power factor there which helps to counteract any lag elsewhere. A total of 45 ckvar capacitance is distributed among the plant motors. The capacitors are located as follows: 15 ckvar at the heavy-media pump motor, 10 ckvar at the raw-coal crusher motor, 10 ckvar at the drier motor, and 10 ckvar at the cyclone-feed pump motor. In addition, 15 ckvar are installed at the controls for the submerged freshwater pump in the river.



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It's the GUYAN RESISTOR!

COMpletely assembled Racked Resistors with all interconnecting bus bars and terminal lugs installed. Custom designed for your individual conditions.

For your heavy service applications we offer Helical Coil construction to end warping and buckling burnouts. One installation proves our modern design is superior. Write for details.

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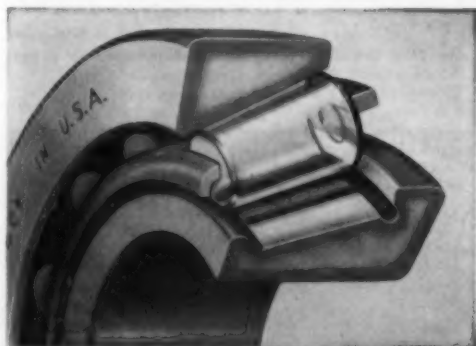
**Guyan
RESISTORS**

Better products, faster, from your Bower bearing specialist:



HONING PROCESS mows down microscopic imperfections still left on bearing raceways after final grinding.

Bower mows down sub-miniature "mountains" so bearings roll longer down in the mine



Bower Tapered Roller Bearings are *Spher-O-Honed*: 1. Roller heads are spherically contour-ground, need no "run-in;" 2. Oil groove is bigger for positive roller-head lubrication; 3. Honing super-finishes inner and outer races for longer life.

Bower hones bearings to reduce friction; save you money on equipment downtime and maintenance costs

Finish grinding of bearing raceways still leaves minute surface blemishes—"mountains" under magnification. So Bower takes a costly extra step . . . uses a honing process to smooth off these microscopic mountains.

Super-finished raceways offer less resistance to rollers. This reduced friction naturally results in less wear and longer life. Bower tapered roller bearings need no initial "run-in." You get higher tonnages from machines, more efficient materials handling; save on bearings and high-cost maintenance labor.

Your Bower bearing specialist can give you fast delivery on his complete line of tapered and straight roller bearings. Call him when you need replacements!

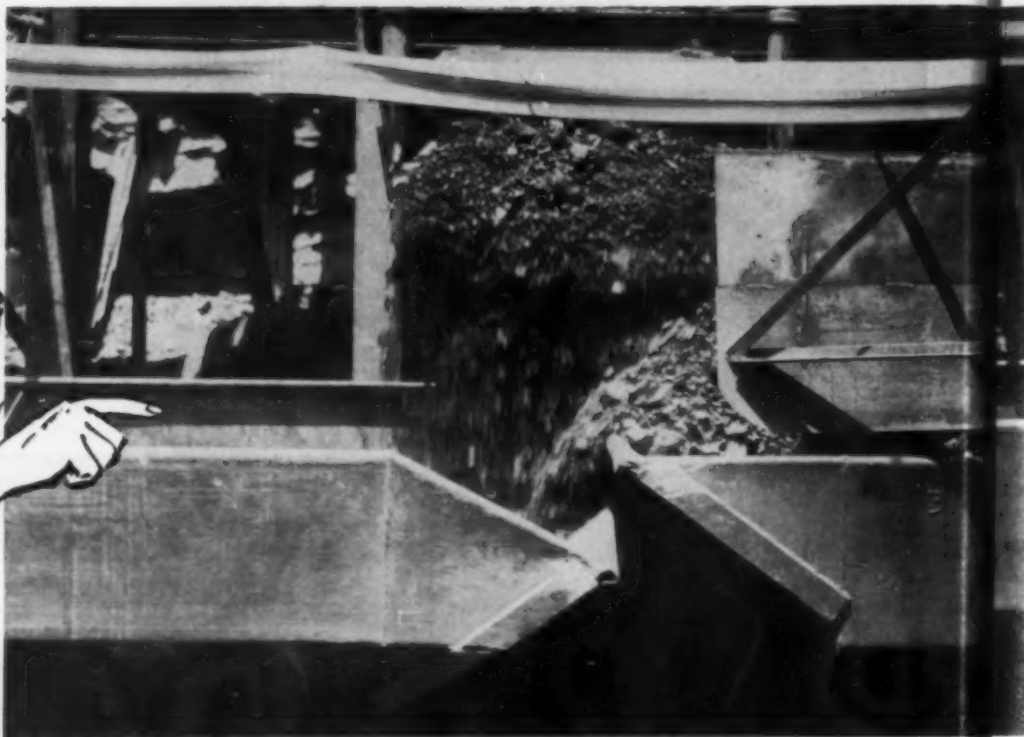
BOWER ROLLER BEARINGS

FEDERAL-MOGUL SERVICE

DIVISION OF FEDERAL-MOGUL-BOWER BEARINGS, INC. • DETROIT 13, MICHIGAN



"Here, in unretouched pictures, why S-D Automatic 'Overlapping haulage cost to the

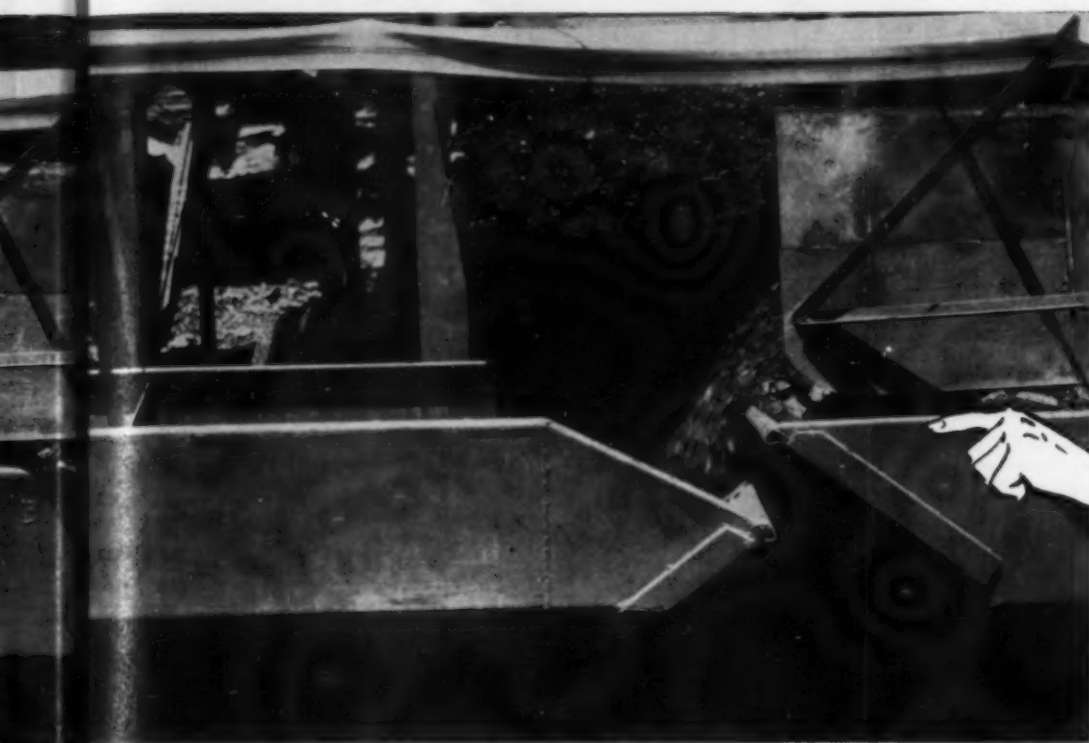


Note coal continues to flow from chute directly over exclusive S-D Automatic "Overlapping Ends" — without spillage between-cars. Photographer shot this picture while trip was in-movement.

This still-shot shows the Top Dresser Bar and Side Dresser Plate, which automatically dress the cars as they are automatically loaded!



is shown one of the basic reasons
**End' Cars will reduce your
 absolute minimum..."**



We had chute discontinue loading at the moment this picture was shot so you could see that in actual operation two things take place: (1) as mentioned, flow of coal continues uninterrupted and also (2) after dressing car to underground haulageway height, surplus coal is plowed into next car in trip—thanks to S-D "Overlapping Ends."

EVERY YEAR, without exception, more mines convert to the S-D Automatic Car Haulage System. What are the reasons?

1. Since the mining operation at the face and the preparation of coal for shipment are separate and distinct functions, operators want them to be carried on independently, so that each may operate in the most economical manner . . . in other words, so that no interruption or slow down in one will interrupt or slow down the other. They want the system that will continuously remove coal from the loading point as it is mined, and, at the same time, will provide a continuous supply for the preparation plant. Automatic Bottom Dumping Mine Cars are the only known means of low cost coal mine transportation that will allow a continuous movement of coal from the face, or loading point, to the railroad car. Reason for this is because these cars are the only method of haulage that can use a low cost, low maintenance, large capacity SURGE BIN, which serves as a temporary storage for coal in transit and thereby balances the mining and preparation operations.
2. Lower initial capital cost — 40% fewer cars required . . . fewer locomotives . . . rotary dump requires special dump at high cost . . . cleaning plant may be of smaller capacity because it does not have to handle all the coal as quickly as it is mined.
3. Lower operation cost — fewer cars, fewer locomotives . . .



Automatic Dumping ON-THE-MOVE!

no rotary dump to operate and maintain . . . no dumping labor, and with S-D "Overlapping End" Cars no loading labor!

4. Greater flexibility — cars of any size and dimension can be dumped over same SURGE BIN, provided each has same track gauge, of course. Double tracks can be used over bin where desirable. No tilting chutes or other similar mechanisms required at loading points; therefore, less head-room and less capital cost, plus minimum time required for moving loading set-up! No other coal haulage system gives the flexibility provided by Automatic Bottom Dumping Car Transportation!

These are some of the fundamental reasons why the S-D Automatic Bottom Dumping Car Haulage System reduces cost to the absolute minimum. How much can you save? We recommend a fact-finding survey by our Application Field Engineer. No obligation, of course. May we get together? Write or call us today!
 Sanford-Day Iron Works, Inc., Knoxville, Tenn.

SANFORD-DAY
 KNOXVILLE, TENNESSEE



30-YD SHOVEL works around the clock while clearing a 75-ft path through broken overburden. Productive time averages 82.7%, and is an important factor in the unit's ability to move nearly 900,000 cu yd of overburden per month.



HYDRAULIC RIPPER breaks up coal for easier loading. Unit rips coal 6 hr, spends rest of shift on dozer work.



COAL SHOVEL is kept busy filling 25-ton coal haulers. Loader has 6-yd dipper, scoops up 4,000 tons in two shifts.

Efficient Thin-Seam Stripping

Peabody combines close supervision, skillful machine operation and four-man preparation-plant operation for successful mining in Missouri. A 30-yd shovel moving 900,000 cu yd per month sets production pace.

CLOSE SUPERVISION of drilling and blasting, skillful operation of a 30-cu yd stripping shovel and coal preparation with a minimum of manpower are keys to successful stripping of 26-in coal at Peabody Coal's

new Tebo mine near Calhoun, Mo.

Tebo mine requires only 68 men to mine, haul and prepare 4,000 tpd of coal from the 26-in Tebo seam. The 30-yd stripping shovel works around the clock seven days a week

to keep ahead of two-shift coal loading. Nearly all the mine's production is shipped by rail to a power plant at Kansas City, Mo., but during the winter heating season production is increased to serve retail trucks with either egg or stoker coal.

To uncover the 4,000 tpd of coal, the 30-yd shovel moves an average of 1,245 cu yd per hour, or nearly 900,000 cu yd per month. This high rate of stripping with a 30-yd machine is the result of a well prepared bank plus an unusually high operating time. For example, operating



RUBBER-TIRED dozer works closely with 30-yd stripping shovel, cleans up loose material that big machine misses.



HORIZONTAL blastholes are drilled 55 ft deep in shale sandwiched between hard limestone and cap rock.



DESTINATION of coal trucks is 200-ton bin feeding preparation plant. Small trucks in background are lined up to purchase coal. Plant is 1.2 mi from pit.

Serves Utility Market

time for the month of November, 1958, was 82.7%.

Pit Conditions

Overburden is marked by several thin layers of hard rock immediately over or near the coal seam. A 12- to 24-in layer of hard caprock may or may not be present immediately over the coal. Above this material is a 6- to 24-in bed of shale, overlain in turn by 12 to 18 in of hard limestone. Shale and soil make up the remainder of the overburden. Total

thickness of the overburden varies from 10 to 50 ft.

Since the hard layers of rock are concentrated in the lower portion of the overburden the company employs horizontal drilling. Whenever possible, 5-in holes are drilled into the soft shale between the caprock and the limestone. Placing blastholes in this layer not only enables the company-designed drill to bore holes faster but also makes possible distribution of explosives where they are most needed. Sometimes the limestone and the caprock come to-

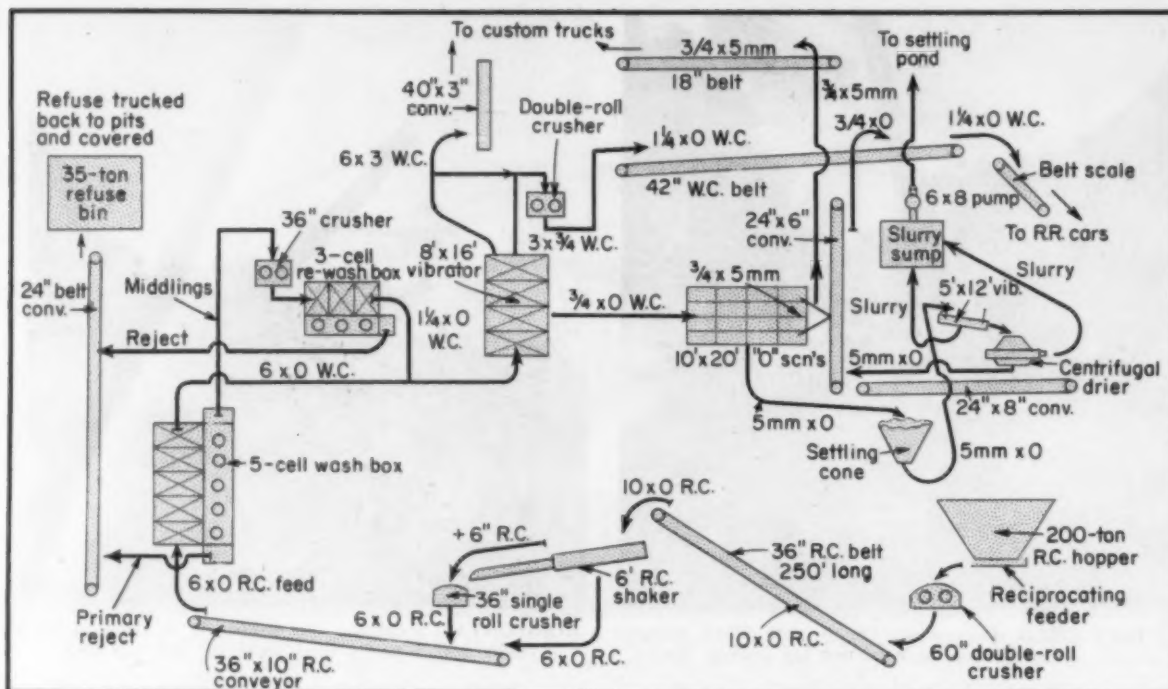
gether and, as a result, drilling is more difficult and some trouble is experienced with augers becoming fouled.

Holes are spaced 21 to 24 ft apart and are drilled 55 ft deep. The company-designed drills are equipped with Coalmaster augers and Coalmaster, Austin and Kennametal bits. A two-man crew on each of two shifts drills 225 to 550 ft of hole per shift, depending on the hardness of the rock and the difficulties encountered. A third man is added on the day shift to charge holes with Austin Apcomite 20A ammonium nitrate explosive with built-in primer. Each cartridge of packaged nitrate and primer weighs 20 lb and measures 4x39 in.

The company strives to maintain a ratio of 1 lb of blasting agent to 8 or 10 cu yd of overburden. Holes are laced with Austin detonating fuse and du Pont 17-MS delays are used between holes.

Uncovering the Coal

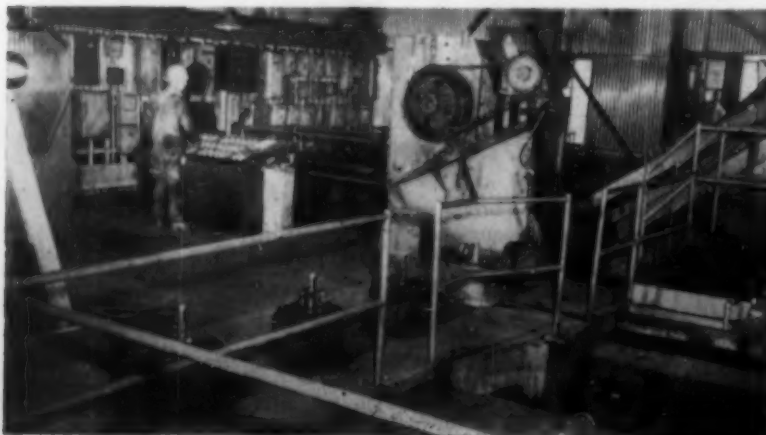
The stripping unit is a Marion 5560 electric shovel which cuts a 75-ft swath through the blasted overburden to expose the 26-in coal seam. A rubber-mounted Caterpillar D6 bulldozer with four-wheel drive works in the pit alongside the shovel to clean up the loose material that the unit cannot handle efficiently.



FLOW DIAGRAM includes raw- and clean-coal crushing, two-stage washing and drying. Plant is operated by four men.



PREPARATION CENTER, sheathed in aluminum, is designed for operation with a minimum of manpower. Plant processes 400 tph of raw coal containing 27% refuse. An automatic car haul eliminates need for car droppers.



PLANT CONTROLS are centrally located beside main wash box handling 6x0 raw coal delivered by 36-in scraper conveyor. One-man controls all plant units.



CENTRIFUGAL DRIER removes water from 5mmx28M coal.



What's the best way to anchor a frog?

That's an easy one to answer: use Bethlehem Hook Twin Frog Plates. The reasons behind this answer are pretty compelling.

First, the hooks on these frog plates are considerably larger and stronger than any spike head; thus they keep a good tight grip on the rail base.

Next, Hook Twin Frog Plates distribute track motion over a broad area of the tie, and remove direct pull from the spikes which anchor the plate. This helps to hold both vertical and lateral thrust in check.

Because these plates are used in pairs (two plates fit neatly on a tie), they can easily be adapted to

any frog position or angle. And they elevate the frog to keep it flush with the running rail.

Hook Twin Frog Plates are available in several lengths. They are low in cost yet they represent a big investment in safety and trouble-free operation. A Bethlehem mine-track engineer will be glad to go over the full story with you. You can reach him through the nearest Bethlehem office, or by writing direct to the address below.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold
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BETHLEHEM STEEL



FREEZEPROOFING is simplified with screw conveyor feeding salt from bin to either of two coal-loading chutes.



DUMMY CAR on each track pulls string of 35 cars by loading point. Car hoist is controlled from loading station.



CENTRALIZED LUBRICATION system delivers clean grease to bearings.



BELT SCALE records weight of coal as it flows to loading chute.

Company management chose the rubber-mounted dozer to prevent the damage or cutting of the coal seam common with crawler-mounted dozers. Since the coal is only 26 in thick to start with, the company believes that it is important to recover as much of it as possible. And by using the rubber-mounted dozer the coal is kept intact.

By installing a central lubrication system on the stripping shovel, the company expects to save money on bearing replacement and also get longer life for moving parts because of regular lubrication. The automatic system also gives the crew more time for cleaning and inspecting the ma-

chine. As a result, potential trouble or delays are headed off and downtime is kept to a minimum. Regular inspection and lubrication, plus skillful machine operation, make it possible for the machine to remove 900,000 cu yd of overburden while operating 82.7% of the available time. The shovel handles 12 cu yd of overburden for each ton of coal recovered.

Loading and Hauling

A Bucyrus-Erie 85B electric shovel with a 6-yd dipper loads coal on two shifts. A fleet of five 25-ton semitrailers pulled by Dart tractors

carries the coal 1.2 mi to the preparation plant where it is dropped into a 200-ton bin. Tractors are powered by Cummins NHS 275-hp diesel engines.

All haulage roads are laid out by Peabody's engineering corps and are built with a minimum width of 45 ft. To enable trucks to travel at maximum speed roads are laid out without sharp curves or steep grades.

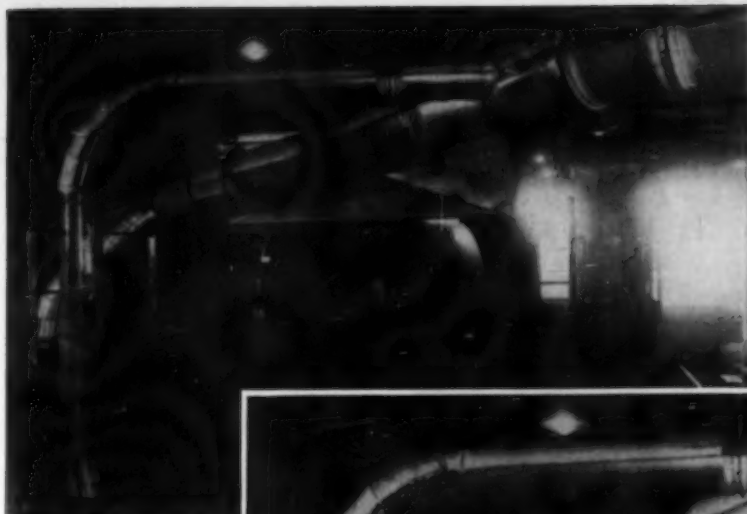
After new roads are cut or filled to grade a 6-in layer of 3-in crushed rock is spread over the surface and compacted. Then 4 in of 2-in crushed rock is added and packed down. From time to time the company adds more 2-in rock to maintain a smooth running surface. A Caterpillar No. 12 grader is available for road maintenance work as needed.

An International TD24 tractor equipped with a Greenville Steel single-tooth hydraulic ripper breaks up the coal before it is loaded. It takes about 6 hr of ripping to break up the hard coal bed. The remainder of the shift is spent cleaning pit roads or building new roads.

Pit Power

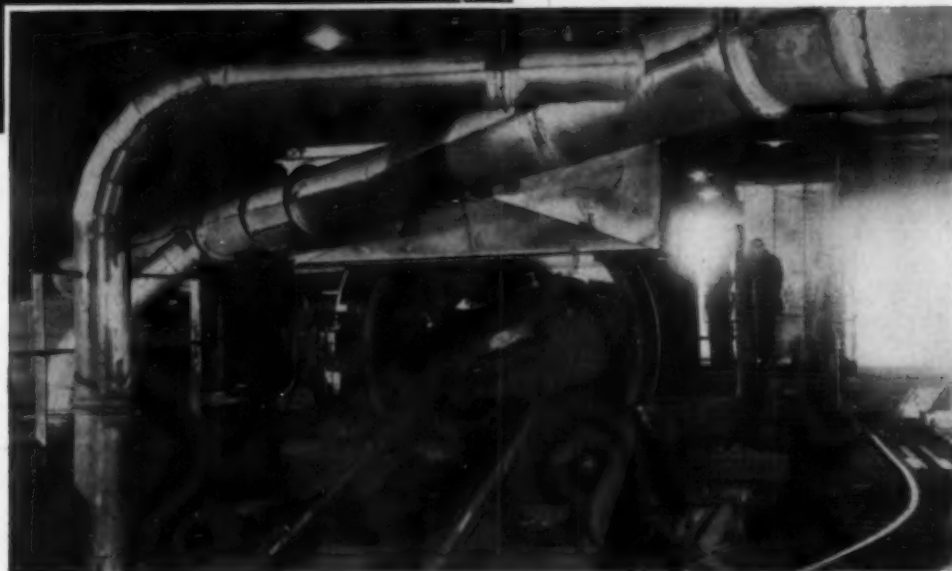
Missouri Public Service delivers power to Tebo mine's metering station at 33,000 V. After splitting into two circuits, power is transmitted at 33,000 V by overhead pole lines to the pit and preparation plant for reduction to operating voltage.

Power for stripping equipment is reduced to 4,160 V by a General Electric 1,050-kva portable substation. A pole line carries the 4,160-V



BEFORE: Inside the dump house before turning on the Joy Microdyne. Unretouched photo shows how dust laden air creates a choking haze.

AFTER: This unretouched photo shows dump house after the collector has been in operation for 15 minutes. The air has cleared, and dusts are carried through ducting to the Joy Microdyne.



WSW 1 7431-284

JOY MICRODYNE DUST COLLECTOR GIVES CLEAN AIR...EVEN IN COAL DUMP

A large coal mine had a serious dust problem. Coal dust from a rotary car dump would fill the air in the building in which the equipment was housed. Over a period of two shifts, so much dust would settle that the conveyor equipment under the dump would clog with dust. A maintenance man would spend most of the third shift with shovel and broom to clear the accumulated dust.

After a 32,000 cfm Joy Microdyne dust collector was installed, maintenance was reduced to a general once-a-week clean-

ing. By mounting the Microdyne halfway between the car dump and a large crusher house, and connecting them with stainless steel tubing, the one dust collector serves both buildings.

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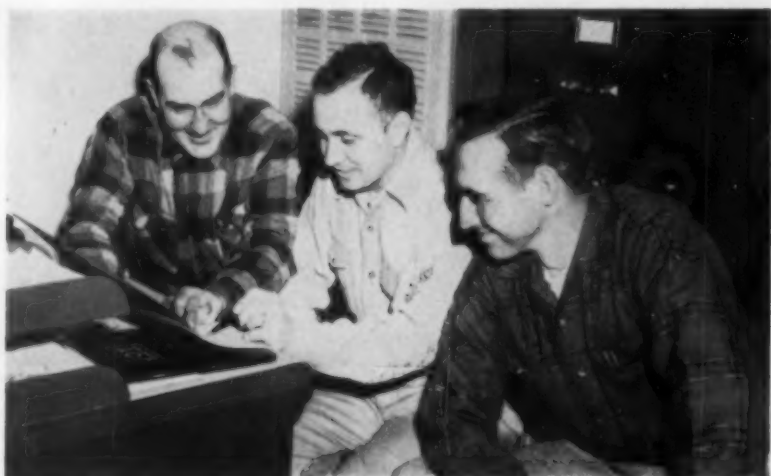
JOY

Joy Manufacturing Company
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LABORATORY at mine makes daily analysis of clean coal, providing mine management with data on washer performance and coal quality.



KEY MEN at Tebo mine are R. D. Van Tuyle (left), superintendent; G. W. Womble, office manager; and J. P. Morgan, assistant preparation engineer.

power from a circuit breaker at the skid-mounted substation to a second circuit breaker in the field. Power then is carried to the pit by Okonite Type SHD cable which terminates at an Atkinson skid-mounted junction box serving the stripping and loading shovels. A short length of cable also extends from the junction box to an Atkinson 75-kva transformer that reduces the voltage to 440 for operating the highwall drills. Power is carried to the drills by No. 6 cable.

Maintenance

Only regular day-to-day maintenance is handled at the mine. All large units or components that can be rebuilt are sent to a central shop at Hume. To take care of the daily

maintenance Tebo employs one welder on each shift, a machinist on the day shift, one electrician and one mechanic on each of the loading shifts.

The five coal haulers are always parked in an electrically heated garage on nonloading shifts or idle days. Constructed of concrete blocks, the 104x60x18-ft building is heated by six ILG 15-kw electric heaters and management reports that the building is a comfortable 60 deg during subzero weather.

Preparation

The Tebo preparation plant is operated by only four men, whose duties are as follows: plant operator; loading point operator; slate picker;

and one utility man who checks the CMI drier and lubrication system, and does general maintenance work.

An automatic car haul, operated from the loading point above and between the two loading tracks, eliminates the need for car droppers. The car haul consists of two dummy cars on separate tracks which are pulled back and forth by a 1¼-in rope connected to a tandem-drum hoist. Each dummy car handles 35 cars and the 70 cars can be loaded without switching. After a string of 35 cars on one track is loaded, the dummy car is disconnected and pulled back as the other 35 are loaded. The car haul was built by McNally Pittsburg to meet Peabody's specifications.

Coal haulers drop raw coal into a 200-ton storage bin from which it is delivered to a 60-in McNally Pittsburg double-roll crusher and reduced to 10-in top size. The crusher product drops onto a 36-in belt and is conveyed and elevated 250 ft to the top of the cleaning plant. There it discharges onto a raw-coal shaker where it is handpicked and separated into plus 6-in and 6x0 fractions. The plus 6-in flows to a 36-in single-roll crusher that reduces it to 6x0. The crusher product and the 6x0 from the raw-coal shaker flow to a 36-in scraper and are carried to a McNally Norton No. 5 washbox.

Primary reject discharges onto an 24-in refuse belt and is carried to a 35-ton refuse bin. Refuse is hauled back to the pit by a Dart 15-ton truck and is buried under the spoil.

Middlings pass to a 36-in American Pulverizer crusher which reduces it to 1x0 for delivery to a McNally 3-cell washbox. Reject from this secondary unit joins the primary refuse on the refuse belt and is conveyed to the refuse bin.

Clean coal passes to an Allis-Chalmers 6x16-ft double-deck Ripl-Flow vibrator which separates it into 6x3, 3x¾ and ¾x0 sizes. The 6x3 may be directed to a 40-in scraper conveyor for loading retail trucks or sent to a 60x36 Gearmatic stoker-coal crusher and reduced to 1¼x0. If the 6x3 is loaded into trucks only the 3x¾ is crushed.

The clean ¾x0 flows to a 10x20-ft shaking dewatering screen equipped with Wedge Wire stainless steel 2-mm and 5-mm screens. The ¾x5mm may be directed either to an 18-in belt conveyor for custom truck load-

ing or deposited on a 24-in scraper conveyor and delivered to the washed coal belt. The 2mmx0 product passes to a settling cone where solids are concentrated before passing to an Allis-Chalmers 5x12-ft desliming vibrator equipped with 28-mesh stainless steel woven-wire cloth. The 2mmx28M passes to a CMI centrifugal drier for mechanical dewatering. Effluent from the drier flows to a sump from which it is pumped to a settling pond by an Allis-Chalmers 6x8 pump. Clarified water is pumped to a reservoir which supplies plant makeup water.

The dewatered CMI product discharges onto a 24-in scraper conveyor which carries it to the conveyor handling the dewatered $\frac{3}{4}$ x5mm product. The combined sizes discharge onto the 42-in washed-coal belt and pass over a Merrick Weightometer belt scale before dropping into the car-loading chute.

During cold weather the washed coal is treated with rock salt to prevent freezing in transit. Salt is purchased in bulk and stored in a bin inside the plant. It is carried from the bin by a screw conveyor to the two-way car-loading chute where it mixes with the coal as it falls into the car. The two-way loading chute is equipped with a motorized gate which is driven by a Westinghouse 5-hp motor transmitting power through a Falk reducer.

Quality Control

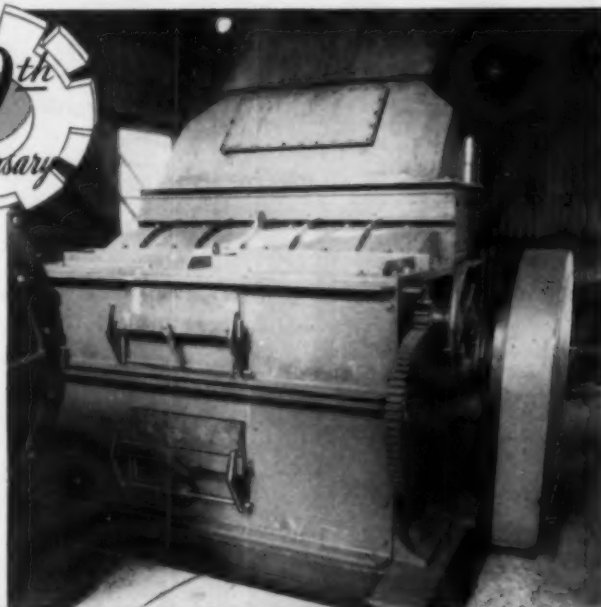
To provide management with information on washer performance and coal quality, clean coal is sampled every 2 hours and analyzed for ash and moisture content. In addition, sink-float tests on clean coal and refuse are made daily to check on washer performance. A weekly composite sample of clean coal is sent to a central laboratory at Peabody's Power mine at Montrose for complete proximate analysis. With the aid of regular sampling and analyses, Tebo management not only is able to maintain the desired preparation standards but also to secure data on the quality of each shipment.

Coming in June

Staff-written abstracts of all papers presented at technical sessions of the AMC Coal Show will be published in the June issue of *Coal Age*.

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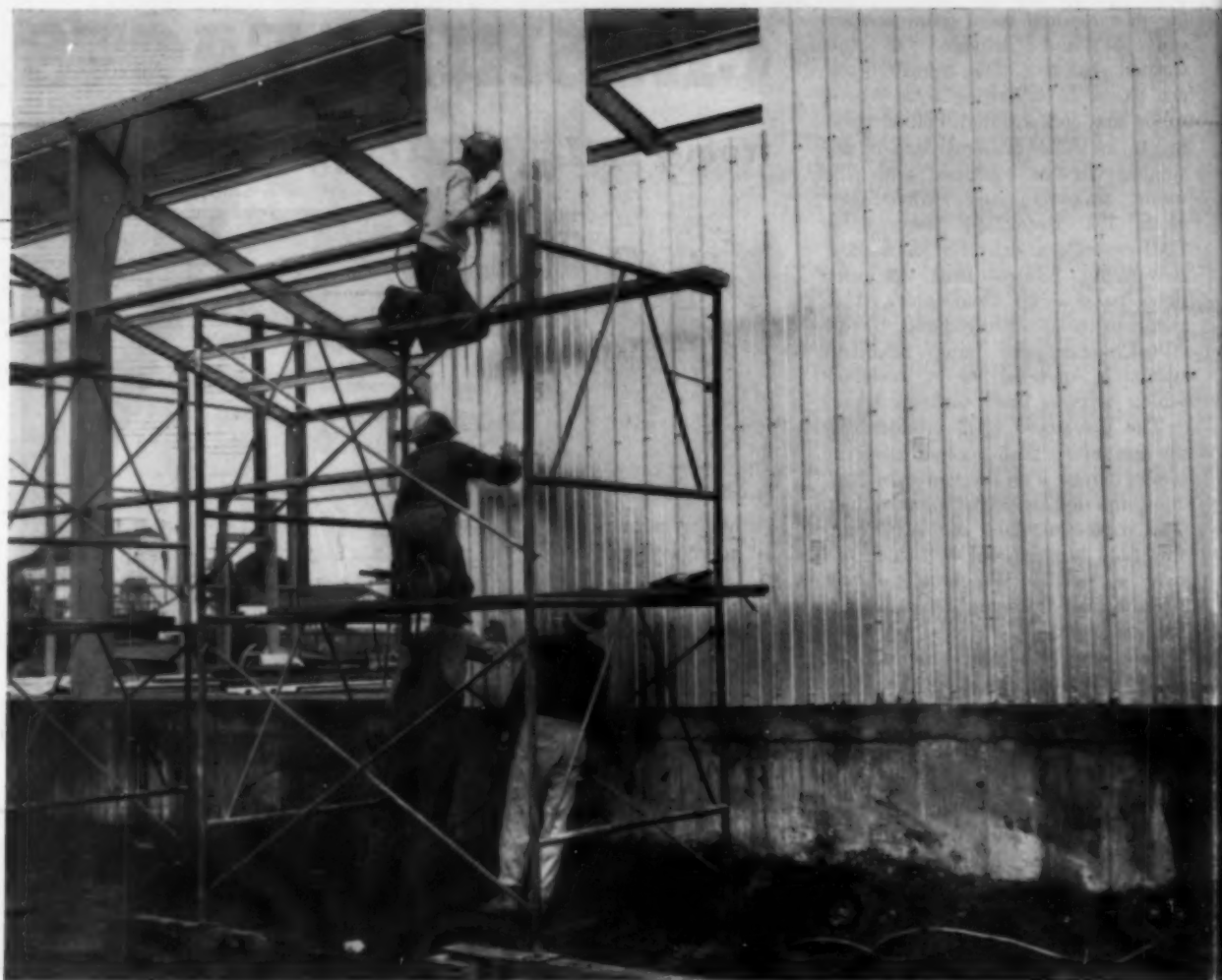
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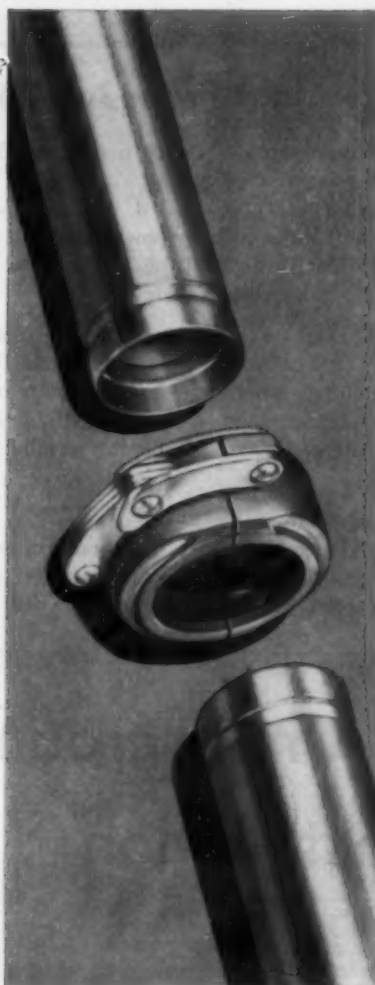
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Getting the Most From AC Cables . . .

1. **Installation and application of high-voltage and portable trailing cables** should be in accordance with state and federal safety regulations. The American Standards Association's "Safety Rules for Installing and Using Electrical Equipment In and About Coal Mines" may be used as a guide when other regulations are not specific.

2. **Steel-wire-armored power cables** may be used in boreholes, shafts or other mine openings where necessary for protection against mechanical damage or additional strength for long suspension.

3. **Nonmetallic neoprene-armored high-voltage mine power cable** is suitable for installation in borehole or shaft, suspension in air, placement in duct, or burial. It is a semiportable cable that can be moved easily and has given satisfactory service

for underground distribution systems up to 15 kv.

4. **Splicing and terminating of high-voltage mine power cables** at electrical equipment can be accomplished safely and easily with suitable coupling devices.

5. **Standard 600-V portable cables** can be used as secondary distribution cables and as machine trailing cables for most AC mining equipment. Wherever possible, cables should be sectionalized to permit installation of additional lengths as workings advance, or easy removal for repair or replacement.

6. **Some improvement is necessary in design of machines and cables** to permit better cable performance with high-speed cable-reeling devices.

Cable for AC Underground . . . Choice and Installation

By **Thomas R. Weichel**
Mining-Electrical Engineer,
The Okonite Co., Passaic, N. J.
Subsidiary Kennecott Copper Corp.

CONSIDERABLE IMPROVEMENT has been made in AC electrical equipment for use underground in the past 15 yr. Development of portable switchgear and distribution stations, transformer stations, mobile mining equipment and other accessories has progressed to the point where they can now be considered standard, and availability is no longer a problem.

Constant improvement in portability and mobility has encouraged improvement of electrical cables to meet the more flexible requirements of high mechanized mining systems. Except for a few modifications in design for some specialized applications, cables of standard construction can be obtained from the cable manufacturer's stock.

Even though considerable improvement has been made in electrical cables and AC mining equipment in the last few years, as in all

mining operations, certain basic safety rules and regulations, covering electrical equipment and cables must be followed to assure the safety of men and property.

Federal and state regulations were based upon installation of DC systems and equipment, and did not provide for modern AC installations. Until these regulations are modified to include such installations we must follow applicable provisions of present mining laws and regulations or other electrical safety codes. The American Standards Association's "Safety Rules for Installing and Using Electrical Equipment In and About Coal Mines" covers most of these regulations and may be used as a guide for selecting the proper type of cable and method of installation.

A typical AC distribution system extending from the borehole installation on the surface to the mining equipment at the working face underground is illustrated in Fig. 1. It is based on a primary distribution voltage of 4,160, and a secondary pressure of 440 V for face equipment. Basic cable constructions in

each stage of the system are keyed into the drawing.

Power Circuits Into the Mine

Power may be taken into the mine through shafts, drifts, slopes or boreholes. Regardless of the type of opening and cable employed, however, certain installation practices and safety regulations should be followed on the surface, such as, protection against lightning and overload, and suitable equipment for disconnecting power from the circuits leading underground. The following ASA safety recommendations apply to surface installations:

"4.7.1 Lightning Protection: Each outgoing power circuit that leads underground shall be equipped with lightning arresters of approved type at the point where the circuit enters the mine. Lightning arresters on the primary side of such circuits will be considered suitable for the secondary circuit on the surface if less than 100 ft long. If the power circuits leading underground are 100 ft or more in

length on the surface, suitable lightning protection shall be provided at the generating station or substation and also at the point where the circuit enters the mine.

"4.7.2 Surface Disconnecting Switch: Each power circuit leading underground shall be provided with a switch or circuit breaker capable of opening each conductor of the circuit under full load. This switch or circuit breaker shall be placed on the surface not more than 500 ft from the point of entrance to the mine, unless equivalent control is readily accessible for opening the circuit in emergencies.

"4.7.3 Overload Protection: All circuits leading underground from substations and transformer stations shall be provided at their source with current-interrupting devices of such capacities and so installed and adjusted that the circuit will be opened if the current in the circuit exceeds the safe carrying capacity of the conductors leaving the stations. Three-phase delta or wye-connected AC circuits shall be protected by a fuse or an automatic circuit breaker in each ungrounded wire. Automatic circuit breakers to open all phases are recommended."

Regardless of how the cable enters the mine it should be adequately designed for the service intended, installed in a permanent manner, and protected against damage from haulage equipment, falling materials, mine waters, electrolysis, and any other destructive factors to which it may be subjected.

The cable used should be of multi-conductor construction with all components encased in a metallic armor, or such nonmetallic armor as a heavy neoprene sheath. If protection is desired against damage from runaway haulage trips on slopes it is advisable to install the cable in a trench or in a recess in the ribs or roof. If this hazard is not present, the cable may be suspended from a messenger secured to insulated hangers or insulators anchored in the roof at suitable intervals.

Cables for Shafts or Boreholes

High-voltage power cables leading underground through deep shaft

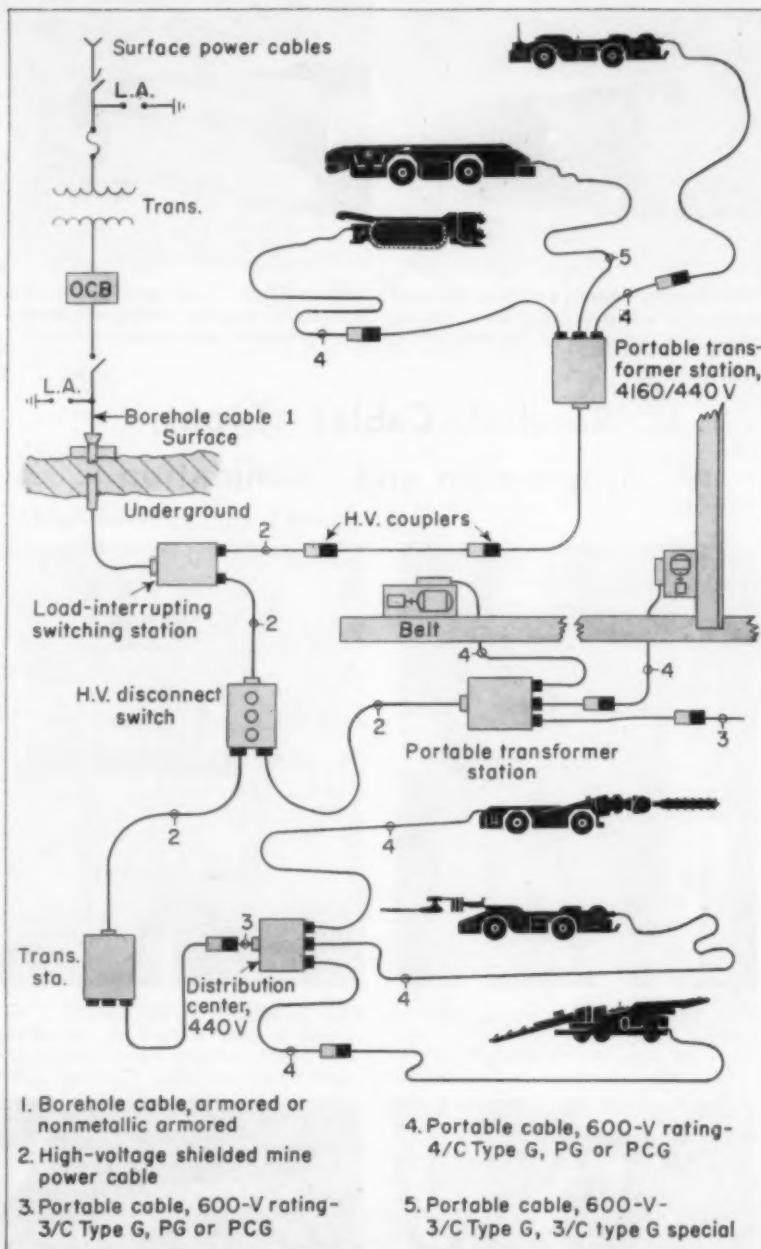


FIG. 1—AC system for underground mining showing cables and equipment.

openings or boreholes (1 in Fig. 1) usually are metallic-armored and suspended by means of the individual armor wires. This type of cable with steel wire armor (Fig. 2) is undoubtedly the preferred one for permanent installations. It can be supported by the armor wires without strain on the conductors and also affords protection against mechanical damage from falling material or moving equipment when installed in a shaft.

Where mechanical protection is not

necessary or where the length of suspension is not too great, installations can be made with neoprene-armored cable and still comply with federal and state mining codes and regulations. Fig. 3 illustrates a high-voltage nonmetallic neoprene-sheathed cable with shielded power conductors and a grounding conductor in each interstice between power conductors.

The following ASA safety rules apply to cable installations in shafts or boreholes:

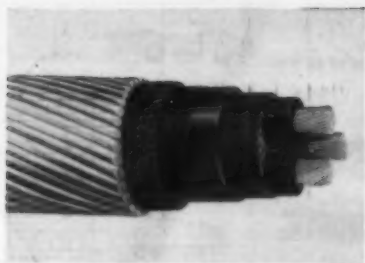


FIG. 2—High-voltage power cable protected by galvanized-steel-wire armor, which also can be used for suspension.

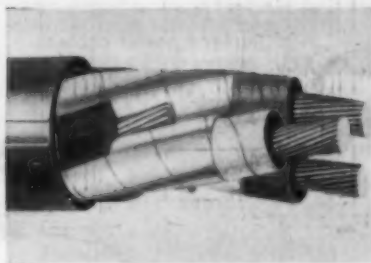


FIG. 3—High-voltage mine power cable with shielded power conductors, grounding conductors and neoprene sheath.

Borehole Cables—Types, Suspension and Termination

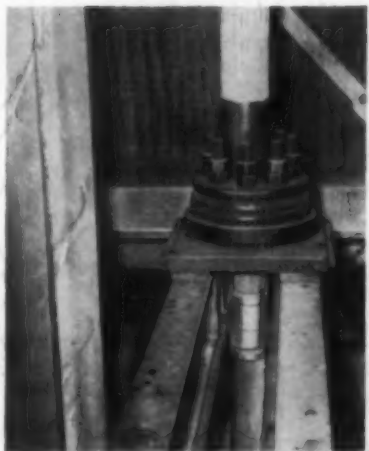


FIG. 4—Typical installation of armored borehole cable supported by armor wire anchored at top of shaft.

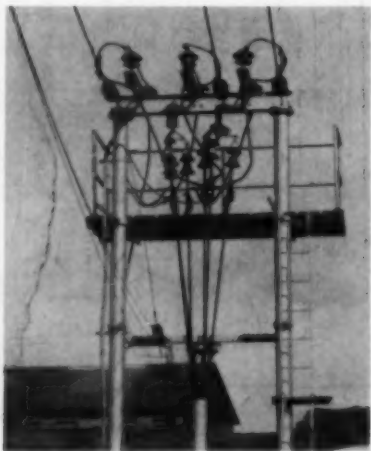


FIG. 5—Strain-type insulators are employed in this method of supporting single-conductor power cables.



FIG. 6—Cable grip supports nonmetallic-armored high-voltage cable in this installation.

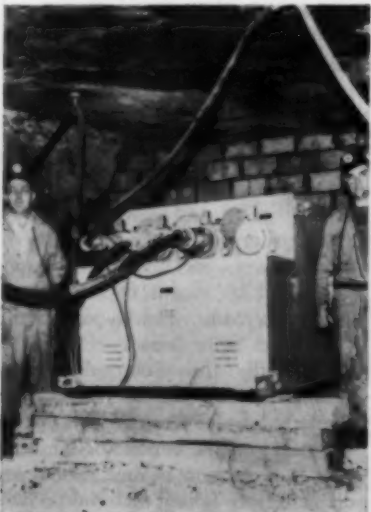


FIG. 7—Mine power cable terminated at gang-operated load-interrupting switch underground.

"4.7.4 Cable Type: Cables in shafts, boreholes and underground passageways shall be adequate for the service intended, installed in a permanent manner, and guarded against damage from external sources. The selection of type of cable, including the mechanical and electrical characteristics of the insulation and outer covering, shall take into consideration electric shock and fire hazards, deterioration from mine water and electrolysis, and also means of suspending or otherwise supporting the cable.

"4.7.5 Cable Insulation and Support in Shafts: All power conductors in shafts shall be covered with approved insulating materials throughout or guarded in an approved manner. Conductors shall be securely fastened in such a way as to support them properly. They shall be supported out of contact with combustible materials. When the length, weight and construction of a shaft cable is such that suspension from its upper end only would subject the cable to possible damage it shall be supported in an approved manner at such intervals as may be necessary to prevent undue strains in the sheath, insulation and conductors.

"4.7.6 Mechanical Protection of Shaft Cable: Shaft cables shall be so placed or protected that they will not be subject to damage from moving cages and skips, ice, coal or other falling materials, nor to damage from mine water and electrolysis.

"4.7.7 Borehole Cable Installation: All conductors passing underground through boreholes shall be installed in an approved manner that will prevent the occurrence of undue strains in sheath, insulation or conductors, as well as damage by chafing of cables against each other or against the borehole casing."

If a shaft or borehole cable handles 2,000 V or less shielding of the conductor is not considered necessary. Over 2,000, however, shielding is recommended.

Suspension Methods

All cables suspended in a shaft or borehole should be provided with a suspension strong enough to support the weight of the cable without im-

posing severe strain upon the conductors and protective sheath or armor. Steel-armored cables should be supported by the armor and a safety factor of 5 is recommended. Non-metallic armored cables should be supported by the conductors or by effective clamping of the sheath. A safety factor of 7 is recommended for nonmetallic armored cables.

Steel-wire armored cables are anchored at the top of the shaft or borehole by securing the individual armor wires in a clamping device. This clamp sustains the full weight of the suspended cable and rests upon the anchoring structure. Fig. 4 illustrates a typical method of suspending an armored shaft cable.

Anchoring of nonmetallic armored cables is accomplished by securing the power conductors to strain-type insulators or by effective clamping of the sheath. Regardless of the method employed the complete weight of the cable is supported by the power conductors. Fig. 5 illustrates power cables supported by the power conductors on strain-type insulators, and Fig. 6 support of a neoprene-jacketed cable with a basket-weave-type grip.

Following is the formula for calculating the safety factor of armored and nonmetallic armored cables with copper conductors:

FORMULA NO. 1—Nonmetallic armored cables, single or multi-conductor:

$$SF = \frac{0.80 AT}{W}$$

SF = Safety factor (should be 7 or more).

A = Area of power conductors in square inches (from Table 1). For multiconductor cables, multiply the area of one conductor by the number of conductors.

T = Tensile strength of copper in pounds per square inch—soft-drawn copper, 30,000 psi; medium-hard-drawn, 50,000 psi; hard-drawn, 60,000 psi.

W = Weight of length of cable to be suspended, in pounds.

FORMULA NO. 2—Metallic-armored cable with steel-wire armor:

$$SF = \frac{0.60 \times BS}{W}$$

SF = Safety factor (should be 5 or more).

BS = Breaking stress each wire

Table I—Area of Stranded Copper Conductors

Cond. Size, AWG or MCM	Area, Sq In
6	0.021
4	0.033
2	0.052
1	0.066
1/0	0.083
2/0	0.105
3/0	0.132
4/0	0.166
250	0.196
300	0.236
350	0.275
400	0.314
450	0.353
500	0.393
700	0.550
1,000	0.785

Table II—Breaking Stress, Galvanized-Steel Armor Wires

Size, BWG	Approx. Breaking Stress, Lb.*
1	9,079
2	7,068
3	6,335
4	5,268
5	4,449
6	3,801
7	3,237
8	2,545
9	1,720
10	1,410

*Calculated on basis of 100,000 psi. Wire of approximately 60,000 psi tensile strength ordinarily is used for cable armor. This factor is included in Formula No. 2.

(from Table 2) multiplied by number of armor wires.

W = Weight of length of cable to be suspended, in pounds.

Cable Termination at Bottom of Shaft or Borehole—A suitable means of disconnecting power from all underground power circuits entering the mine through shaft or borehole should be provided within a reasonable distance of the bottom of the shaft or borehole. A distance of 500 ft is recommended in the Federal Mine Safety Code, Art. VIII, Sec. 6 (c):

"Disconnecting switches shall be installed underground in all main power circuits within 500 ft of the bottom of shafts and boreholes, and at other places where main power circuits enter the mine."

Fig. 7 shows a method of terminat-

ing a neoprene-sheathed 5-kv shielded mine power cable at the bottom of a borehole through a gang-operated load-interrupting switch with a remote station for control of the circuit breaker on the surface (OCB, Fig. 1).

High-Voltage Distribution Cables Underground

The cable most commonly used for distribution of high voltages underground is a nonmetallic neoprene-armored mine power cable which also is used in shafts or boreholes (2 in Fig. 1). It is illustrated in Fig. 3. Conductors are insulated with a high-voltage ozone-resisting insulation, each conductor is shielded with a tinned-copper shielding tape, bare copper grounding conductors in each interstice are in contact with the shielding, and the complete assembly is encased in neoprene.

Cables of this construction have been used successfully for voltages up to 15 kv but most requirements in the past have been for 5-kv service. It is also used as a power feeder cable at open-pit mining operations employing 4,160- and 6,900-V systems. This cable is suitable for installation in boreholes or shafts, and for horizontal runs in underground entries. It can be buried in a trench, placed on the mine floor where necessary, or suspended on insulated hangers or messenger.

Although some mine laws permit only metallic-armored cables for high-voltage installations the shielded neoprene-sheathed cable has given excellent service in all types of mines for the past 20 yr and is the construction preferred by most mining companies. It is a semiportable cable that can be moved easily without danger of damage to the cable, and is well suited to modern high-speed mining applications requiring frequent movement of the equipment.

Some high-voltage distribution systems are equipped with mine power cables having one of the three grounding conductors insulated for the purpose of providing a constant check on the continuity of the grounding system. This conductor is insulated for 600 V although the circuit is operated at a much lower voltage. This type installation causes the main circuit breaker to open in event the ground-check circuit is opened, and can be used to advan-



FIG. 8—Wire clips on messenger and insulated hangers support this high-voltage cable.



FIG. 9—Cable support with cable clamps fastened to insulated hangers in the roof.

Underground Distribution —Cable Suspension, Connection, Transformers.



FIG. 10—Rib anchor for high-voltage key-locked coupler feature this installation.



FIG. 11—Gang-operated disconnect switches provide for branch-circuit connections. Remote-control facilities in unit provide for tripping main breaker.

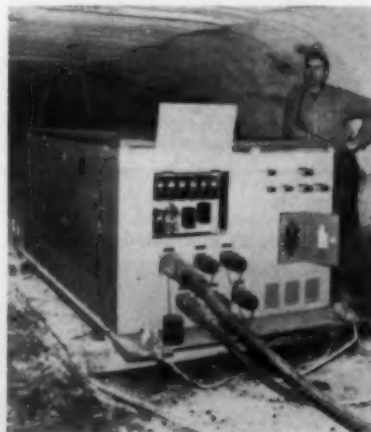


FIG. 12—High-voltage portable transformer station includes connector outlets for secondary distribution and machine trailing cables.

tage for emergency tripping of the main circuit breaker.

Art. VIII, Sec. 4, of the Federal Mine Safety Code applicable to high-voltage cable includes the following specifications:

"(a) All underground power wires and cables shall have adequate current-carrying capacity; shall be protected from mechanical injury; and,

with the exception of trailing cables and power cables connected to junction boxes, shall be installed in a permanent manner . . .

"(c) All underground high-potential transmission cables shall be:

"1. Installed only in regularly inspected airways or haulageways.

"2. Covered, buried, or placed so as to afford reasonable cable pro-

tection against damage by wrecked trips, trolley equipment, roof falls and blasts.

"3. Guarded where men regularly work or pass under them unless they are 6½ ft or more above the floor or rail.

"4. Securely anchored, properly insulated and guarded at ends.

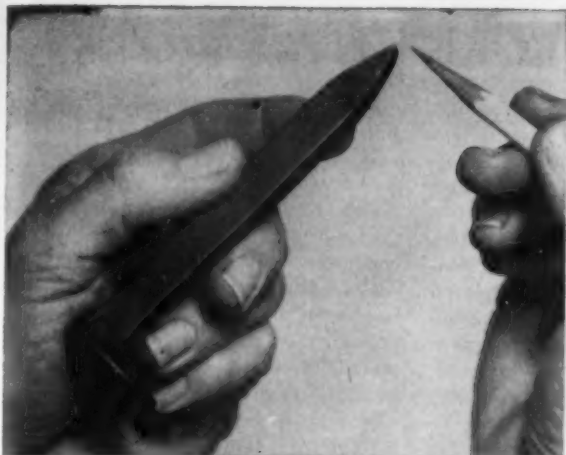
"5. Covered, insulated or placed to prevent contact with trolley and low-voltage circuits."

Fig. 8 illustrates a method of installing high-voltage cable on a messenger wire in an underground haulageway. The cable is wire clipped to the messenger and the messenger is secured to insulated hangers fastened to expansion bolts anchored in the mine roof. This method of installation provides adequate ventilation for the cable, permits visual inspection throughout, protects against minor roof falls, and makes for ease of installation as well as removal to other locations when desired. Fig. 9 illustrates another method of supporting cable with cable clamps attached to insulated hangers in the mine roof.

Power-cable connection can be accomplished by splicing the insulated conductors with suitable materials in an approved manner. Connection can also be made through a splice box or approved-type cable coupler. A typical installation with high-voltage coupler is shown in Fig. 10. Here, the coupler is anchored to the rib adjacent to the cable messenger. A key lock prevents unauthorized opening of the coupler.

Branch circuits can be easily connected to the main high-voltage mine power cable with a portable switching station such as illustrated in Fig. 11. This shows a branch circuit switching center equipped with gang-operated disconnect switches. In addition, the unit is equipped with a remote-control switch inserted in the ground-check circuit for tripping the main circuit breaker to prevent opening of the disconnect switch under load. The switching unit is equipped with high-voltage cable couplers to permit safe and easy removal or attachment of the cable.

The main high-voltage cables terminate at portable transformer stations similar to the unit shown in Fig. 12. The high-voltage cable connection is made with a coupler or to a terminal provided in the transform-



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er compartment. The low-voltage secondary distribution cables or machine trailing cables originate at the transformer station.

Low-Voltage Portable Cables For AC Mining Systems

Secondary Distribution Cables — Low-voltage portable cables between the transformer and the mining equipment (3, 4 and 5 in Fig. 1) require more frequent movement than the permanent and semipermanent high-voltage borehole and mine power cables already discussed. In some instances it is possible to locate the transformer near the mining equipment. Thus the machine trailing cables can be connected directly to the transformer station, eliminating

low-voltage distribution cables. However, most installations require secondary distribution cables (3 in Fig. 1) between the transformer station and a distribution center located as close to the equipment as operating conditions will permit.

Cable for secondary distribution circuits should be of a standard construction so that it can be replaced easily and also will be interchangeable with cables for similar applications in other sections of the mine. For portability, flexible stranding (Class G or H) should be used. To withstand the severe conditions of mine service, insulation should have good heat- and moisture-resisting qualities, and sheath material should have good resistance to abrasion, oil and grease, moisture, acids and alkalies, and comply with the flame-

resistance requirements of Schedule 2F, U. S. Bureau of Mines.

Typical neoprene-sheathed portable cable constructions used for secondary distribution are three-conductor Type G, Fig. 13; four-conductor Type W, Fig. 14; three-conductor Type PG, Fig. 15; and three-conductor Type PCG, Fig. 16. In some instances, where the size of the conductor required is 300 MCM or larger and multiconductor cables would be exceptionally large and costly, single-conductor portable cables have been triplexed (twisted together) to form a multiconductor cable.

Secondary distribution cables are not always installed in the same manner as high-voltage cables. The method of suspension differs somewhat because the installation is not

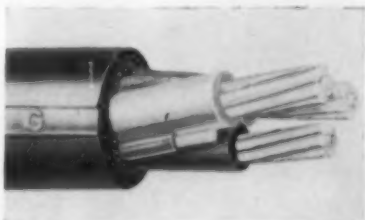


FIG. 13—Three-conductor Type G 600-V portable cable—standard construction with three insulated power conductors and three grounding conductors (green) in interstices, latter with total circular-mil area per IPCEA Table 10X, Part 7—in no case less than 74% of the CM area of one power conductor.

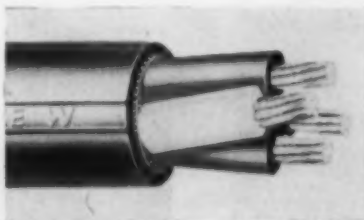


FIG. 14—Four-conductor Type W 600-V portable cable—standard construction with four insulated power conductors, one (green) a grounding conductor.

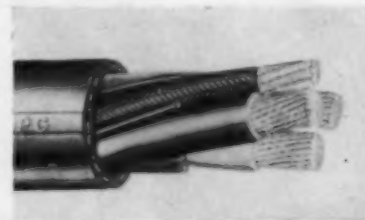


FIG. 15—Three-conductor Type PG 600-V portable cable—standard construction with three insulated power conductors and one grounding conductor. Similar to four-conductor Type W except grounding conductor is uninsulated, has 50% of the CM area of one power conductor and is covered with green cotton braid.

Cables and Equipment For Face Service.

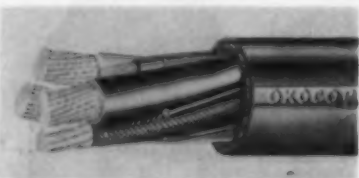


FIG. 16—Three-conductor Type PCG 600-V portable cable—construction identical to three-conductor Type PG except for addition of two insulated control conductors (No. 10 AWG) providing a series circuit through cable connectors for tripping circuit breaker in event connectors are disengaged with power on cable.

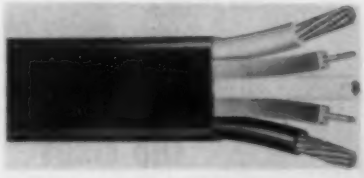


FIG. 18—Three-conductor Type G parallel 600-V portable cable—three insulated power conductors and two grounding conductors with a grounding conductor each side of center power conductor.



FIG. 17—Three-conductor Type G Special 600-V portable cable has three insulated power conductors with "Y"-shaped braided copper grounding conductor in center.

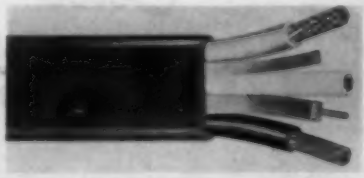


FIG. 19—Three-conductor Type G parallel 600-V portable cable. Construction is identical to that in Fig. 18 except single grounding conductor is used between two of the insulated power conductors. This reduces the overall cable dimension as well as splicing labor.

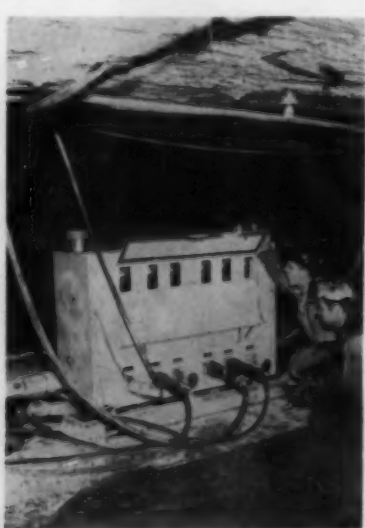


FIG. 20—Low-voltage distribution center for trailing-cable connection to secondary 440-V distribution cable provides a circuit breaker and ground-fault protection for each branch circuit.



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In service with the Sioux City & New Orleans Barge Line since early spring of 1958, the 3200-horsepower *Crescent City* has demonstrated the effectiveness of Dravo's *precision-balanced propulsion* concept in towboat design:

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intended to be permanent. Insulated straps, hooks or insulators that can be recovered easily are used for suspending the cable from the mine roof.

Where the secondary distribution cable is advanced as mining progresses it is desirable to sectionalize the cables in lengths suitable to the mining system. Connectors suitable for the cable used are installed at each end of the cable sections and sections are added as the mine operations advance. Sectionalizing cables also permits easier and more efficient handling of the cable during installation and removal for repair.

Machine Trailing Cables — A machine trailing cable is defined in U. S. Bureau of Mines Bulletin 514 as "a flexible cable or cord for connecting mobile, portable or stationary equipment in mines to a trolley system or other external source of electric energy where permanent mine wiring is prohibited or is impracticable." Trailing cables may be classified as (1) flexible cords or portable cables coiled on power-driven take-up reels or (2) flexible cords or portable cables between permanent wiring and portable equipment.

Trailing cables used with AC mining equipment (4 and 5 in Fig. 1) require three power conductors and one or more grounding conductors depending upon construction. The three-conductor Type G round cable (Fig. 13) with three insulated power conductors and three grounding conductors is a standard construction and gives satisfactory service for most applications. High-speed reeling, however, may cause breakage and failure of the grounding conductors.

Some mine operators prefer the standard four-conductor Type W cable (Fig. 14) with four insulated power conductors, one used for grounding. The principal reason is the ease of splicing one grounding conductor rather than the three in Type G. Otherwise, the advantage is in favor of Type G because of smaller diameter and slightly lower cost.

Three-conductor Type PG and PCG trailing cables (Fig. 15 and 16) also are used in many AC systems. Type PG has three insulated power conductors and one half-sized grounding conductor. Type PCG is the same as PG, except for the addition of

two insulated control conductors (No. 10 AWG). The control circuit permits tripping the branch circuit in event cable connectors are disconnected accidentally. Neither of these cables is recommended for operation on cable reels but exceptionally good results have been obtained when used as trailing cables to equipment and as secondary distribution cables.

A recent addition to the standard types of cables is a special Type G round cable (Fig. 17) with a "Y-shaped" braided copper grounding conductor in the center. Except for some difficulty in splicing the grounding conductor this cable is reported to have given good service on cable-reel equipment. The ground provides partial shielding between power conductors. Failure of any phase wire usually will be to ground rather than phase to phase.

Another modification of a three-conductor portable cable is a three-conductor parallel cable of flat construction similar to the twin-type cables used on DC equipment. This cable has three insulated power conductors parallel to one another. For Type G construction the grounding conductors can be located between the power conductors or made up as one conductor inserted between two of the power conductors. These constructions are illustrated in Figs. 18 and 19. Both have given satisfactory service for applications where the cable is subject to accidental runover by mobile equipment. Not too much experience has been obtained from application on cable reels, but with proper traverse control and handling it is believed suitable results could be obtained on some machines.

Location of the grounding conductor or conductors between the power conductors assures failure to ground rather than phase to phase in event of breakdown of insulation on the power conductors. Additional protection against failure to ground or between phases is provided by the formed insulating saddle over the grounding conductor. Main disadvantages are splicing of grounding conductors and the abnormally large major diameter.

Cables used on power-driven reels have a relatively short life when compared to other applications. They are subject to damage from runover by equipment, continual bending around small pulleys or sheave

wheels, twisting and pulling. Maximum pulling or maximum working stress should be limited to 10,000 psi, or about 0.008 lb per cir. mil of conductor size. Normal working stress may be taken as 5,000 psi or about 0.004 lb per cir. mil.

Equipment with cable reeling devices is generally fitted with rollers or sheave wheels to guide the cable to the reel. If, however, bending is excessive about these rollers or wheels, as previously mentioned, it may cause breakage of the conductor and result in damage to the insulation or sheath. Sharp bends should be avoided. Recommendations for minimum bending diameters are as follows:

Minimum Bending Diameter For Flexible Cords and Portable Cables Used on Take-up Reels for Sheaves

Single-conductor cable, 0-5,000 V, cable diameter times 16; multi-conductor, cable diameter times 12.

Over 5,000 V, cable diameter times 16 for both single- and multi-conductor.

These are the smallest diameters to which portable cords and cables may be bent repeatedly without endangering insulation and sheath.

A typical low-voltage distribution center is illustrated in Fig. 20. This unit provides means for making branch circuit connections to the secondary distribution cable serving the individual machine trailing cables. Each trailing cable is connected to the distribution center with a cable connector and protected by a separate circuit breaker.

Machine trailing cables that are not reeled are sometimes installed on insulators or insulating cable hooks, but the common practice is to lay the cable on the mine floor. In some instances the full length of cable is stored in long loops at the entrance to the working place and pulled out as the working place advances. This method may cause overheating.

Wherever possible cables should be sectionalized into suitable lengths equipped with safe-type connectors at the ends. This permits easy addition of sections as workings advance, eliminates piling of cables, and permits easy removal of faulty cable for repair or replacement. Cable connectors can be molded to the cable or can be the attachable type applied by the electrician.

Shrink distance...and OVERHEAD



with hustling, go-anywhere tractor

Are you still supporting *part-time* pit workers — 3 or 4 crawler tractors — for maintenance jobs? You're carrying unnecessary overhead if you do. Limited speed and mobility tie crawlers down to a limited working area. Lack of continuous work in those "pockets" often keeps them idle much of the day. Yet the cost of owning and maintaining a fleet of localized dozers is continuous.

It's possible that you may be able to replace those inefficient units with a single tractor... a mobile dozer-on-rubber that goes anywhere anytime you have work to be done. The 17-mph, 218-hp LeTourneau-Westinghouse C Tournatractor® is a "hit-and-run" specialist that handles pit housekeeping just as efficiently as a fleet of several special-purpose crawlers and can often cut clean-up

and other dozing expense by half the present cost or more.

Travels at twice crawler rate

Tournatractor gives you the speed and mobility that pays off in servicing scattered locations. Travel to the next job is at speeds up to 17 mph — twice as fast as that of most crawler-mounted dozers.

Speed ranges, 4 forward, 2 reverse, are selected by simple hand lever. Within ranges, torque converter automatically adjusts power to load. Blade movement is accurately controlled electrically, through fingertip dashboard switches.

Check your multiple tractor operations for productive hours of operation. If travel and waiting time figures 30% or more be sure to ask for a Tournatractor demonstration.

Stripping dirt and clay overburden is just one of many jobs C Tournatractor takes in stride for Millbrook Quarries, Inc., Broad Run, Va. Handy "hit-and-run" dozer also cleans up pit after blasting, shapes limestone stockpiles, cleans around crusher, and tows equipment. Output averages 1,000 tons per day.



"If I could get a hold on it, I could move a mountain with this Tournatractor," says Operator Claude Wampler at Millbrook Quarries. "This dozer's got plenty of power and speed, doesn't take all day to get to a job. It's easy to throttle down from high travel-speed."

CT-2027-MQJ-1



LETOURNEAU-WESTINGHOUSE COMPANY, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

Where quality is a habit

ANNOUNCING

the New Heavy Medium Cyclone Washer for fine coal, 3/4 inch to 48 mesh

Now available to coal producers in the United States

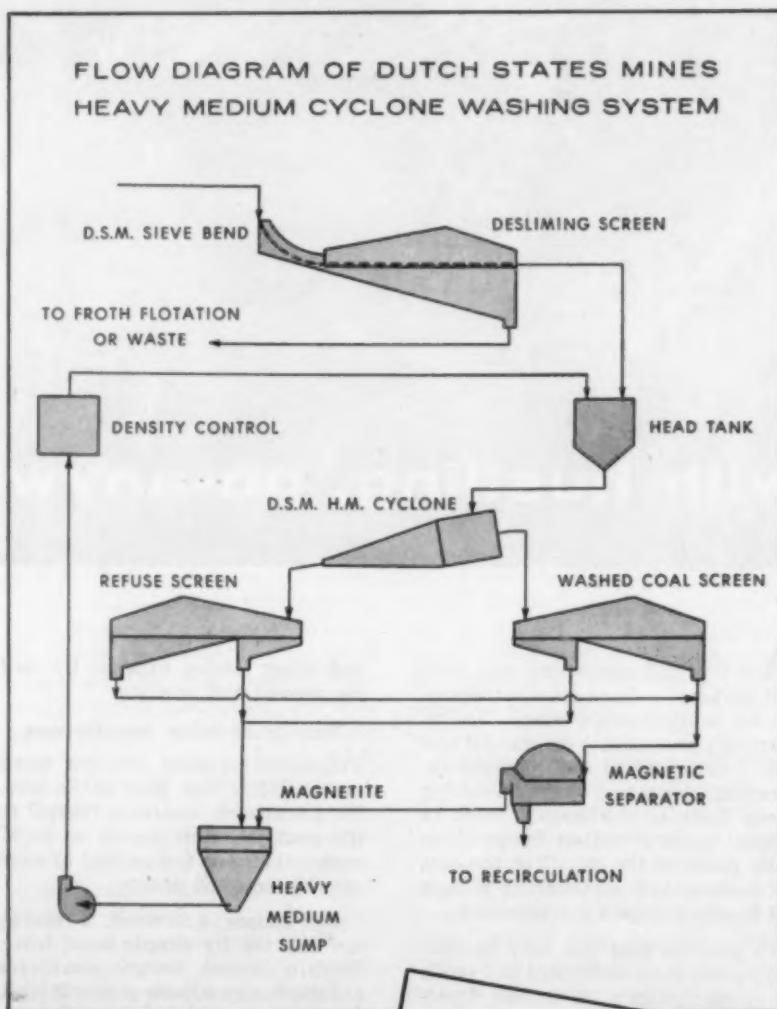
ROBERTS & SCHAEFER is proud to announce its appointment as exclusive representative in the United States for the famous Dutch States Mines Heavy Medium Cyclone Washer for fine coal, 3/4 inch to 48 mesh.

The completely new, heavy medium cyclone washing system will offer many coal producers unique opportunities to improve operations, increase yields of fine coal, reduce costs and deliver a better quality coal to their customers.

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During the past 50 years, Roberts & Schaefer has pioneered many innovations in coal processing and cleaning methods and facilities. The new Dutch States Mines Heavy Medium Cyclone Washing System is another exclusive feature of the flexible and comprehensive service provided to the nation's coal mining industry by Roberts & Schaefer.

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YES ☐ or NO ☐ ?



Photo shows how a regular program of maintenance with grader can keep haul routes smoother... can help you boost the number of hauler round-trips. Grader is raising the practical speed-limitation of this road at least 5 mph. How many extra tons would that produce at your digging... daily? ... yearly?

Are you getting top possible output? Is your cost-per-ton as low as can be?

Check your answers to the following questions. Then consider how the services of additional, fast-working graders — or more extensive use of present machines — can step-up output... cut operating costs... boost net profit.

Yes ☐ No ☐ **Do you blade haul roads regularly?** Smooth-graded roads speed hauling, for more trips per day... cut hauler downtime, reduce tire wear, make roads safer.

Yes ☐ No ☐ **Do you keep pit floors clean?** Do you clean-up quickly after blasting? A regular program of clean-up pays-off. Maintenance of wide, clear traffic-ways makes all areas quickly accessible by shortest route. It speeds loading and hauling... prevents accidents... reduces wear on tires and machines. Regular clean-up, and good drainage prevents dirt and refuse from weathering into ore, minerals, or coal below the floor.

Yes ☐ No ☐ **Do you practice good housekeeping around plant?** A clean plant area speeds equipment traffic, reduces dust, increases efficiency. It pays to keep roads, runways, and working areas neat, clean, and

workable at all times by leveling or removing fall-off from heaped trucks... spillage from around crushers, grizzlies, conveyors, trestles, etc.

Yes ☐ No ☐ **Do you keep stockpile toes pushed in?** Scattered piles limit working space, tend to down-grade material, increase loading costs. A regular program to roll-back thinly-spread toes costs little, pays-off big in time and material saved.

Yes ☐ No ☐ **Do you keep dumps smooth and level?** You speed hauling and dumping, cut costs, when dumps are smooth, level, dry. A grader can handle dump maintenance and drainage quickly. Its offset blade reaches far out beyond wheels to safely cast material clear over edge. And as it travels to-and-from the dump, grader smooths your haul road.

Yes ☐ No ☐ **Do you promptly clean washed-down dirt off benches?** Every rain may wash dirt onto upper benches... may lower the quality of rock and ore below. Prompt grader service halts "waah," provides planned drainage, piles refuse for easy removal by scraper or loader and truck.

Yes ☐ No ☐ **Do you put a grader on your exploration or development "teams"?** A modern grader can build a smooth well-drained roadway in a matter of hours... can speed exploration work by maintaining good access roads for quick transport of men, supplies, and equipment.

Yes ☐ No ☐ **Do you keep ditches clear... drainage open?** Just a few hours of grader work per week on ditches along roads, in pit, and elsewhere, will keep drainage open... assure fast run-off. A planned drainage system and a regular maintenance program prevents seepage of dirty water into pit bed... minimizes break-up of haul roads... keeps haulers and shovels operating on dry footing.

Before you buy any grader, be sure to get complete information about fast, powerful, L-W Adams' Model graders. These LeTourneau-Westinghouse machines are offered in weight, power, and price-ranges that will exactly fit your needs. Seven models: 190, 160, 135*, 123, 115, 80, 60 hp. Choice of GM or Cummins engine on 6 larger models. Write for details.*

*With torque converter

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LETourneau-WESTINGHOUSE COMPANY, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

Where quality is a habit

Industry Moves Ahead with Plan '59...

To modernize now for growth and profits

The most expensive task to be performed in America, in this new year of 1959, is the modernization of our industrial plant and equipment. This is true despite the huge expenditures on new facilities made in the past decade.

Contrary to popular opinion, and even to much learned opinion, our industrial facilities are not up to date. In a special survey conducted in August 1958, and supplemented by further interviews since that time, the McGraw-Hill Department of Economics found that it would take \$95 billion to bring all our plant and equipment up to the best modern standards. This is over \$15 billion more than the record budget of the U.S. government for the coming year.

How did we get so far behind? It is true that business has made record capital expenditures in recent years, but most of this investment has been to expand capacity. And in concentrating on new capacity, industry has fallen behind on the modernization of older facilities. Meanwhile, the \$8 billion a year surge of research and development has brought forth new machines and new processes, at a rate that

makes prewar and even early postwar equipment badly obsolete.

The lag between what research has promised—especially in more efficient tools of production—and what has actually been accomplished up to now shows clearly in the AMERICAN MACHINIST inventory of metalworking equipment for 1958. This new study, covering 167 types of equipment in 5,800 metalworking plants, shows that three out of five metalworking machines are over ten years old. This is a startling indication of how obsolete many plants have become. A 1958 machine tool is 54% more productive than one purchased in 1948. Many of the tools industry now uses are actually of 1939, or earlier, design.

Investment Starts Up

Now industry's plans for 1959 show a new awareness of the need to modernize. In its surveys, conducted during the last part of 1958, the McGraw-Hill Department of Economics discovered these facts:

(1) Companies generally believe that a larger investment in modernization will

mean more profits—soon. Most of the manufacturing companies in the surveys expect their current modernization expenditures to pay off in less than five years. With labor costs rising steadily, it is only with better, more modern equipment that most companies can hope to make these profit gains.

(2) Industry's plans for modernization have been revised upward. Total plans for 1959 investment, in new plant and equipment, now come to \$33 billion—compared with \$31 billion reported earlier. And most of these new plans are directed toward modernization—installing new processes or making ready for new products, developed out of the most recent scientific advances.

It therefore seems clear that modernization expenditures in 1959 will rise enough to make an impressive start on the job of updating our plant and equipment. But it will be no more than a start. Research also is moving ahead with giant strides. Plant expenditures must increase rapidly, from 1958's low level, to win the battle against obsolescence.

How Can We Modernize Faster?

What can we do to accelerate industry's new drive for more modern plant and equipment? One aid will be an improved flow of technical information on how, and where, to modernize. With this purpose, the McGraw-Hill Publishing Company several months ago inaugurated PLAN '59, a joint effort by all its magazines to spotlight the best opportunities for modernization. During 1959, McGraw-Hill publications will continue this effort by putting special emphasis on new developments in plant and equipment.

On the key problem of financing modernization—the question “Where's the money coming from?”—the McGraw-Hill Department of Economics plans several new studies in the months ahead. The first of these will deal with the number one problem in financing: the need for adequate depreciation allowances. Such studies

are a small, but we hope a helpful, part of the total effort that is needed to modernize American industry.

An Individual Effort

The really vital steps in modernizing must be taken by individual companies. The backlog of obsolete plant and equipment is widely dispersed, among firms of all sizes and in all areas. It cannot be wiped out by dynamic equipment policies on the part of a few leading firms. Not just a few, but thousands of industrial companies must take inventory of their respective equipment and compare it, case by case, with the best new machines available.

Finally, there is need for increased public recognition of the modernization problem, and for federal tax policies appropriate to a period of rapid technical change in business.

The most important point is that the modernization drive has begun. This start can accelerate, with intelligent business and public policies, to give us truly modern industrial facilities. Plant and equipment expenditures are finally beginning to reflect the stepped-up pace of research and development. This can be a major factor in renewed economic growth and prosperity as we move into 1959.

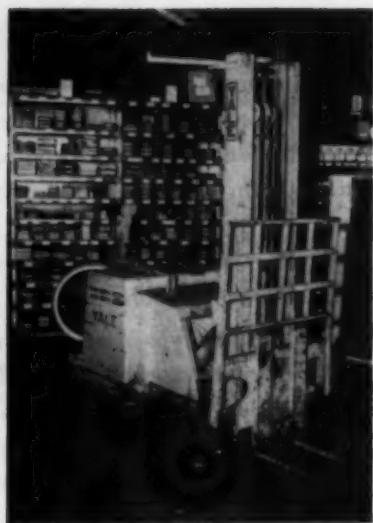
This message was prepared by the McGraw-Hill Department of Economics as part of our company-wide effort to report on opportunities for modernization in industry. Permission is freely extended to newspapers, groups or individuals to quote or reprint all or part of the text.

Donald C. McGraw
PRESIDENT

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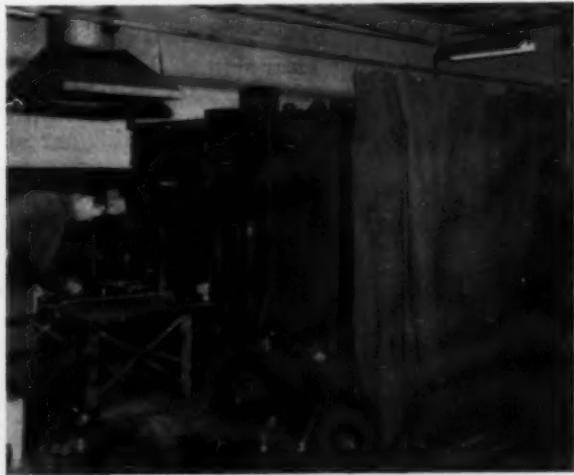
SKILLED MACHINISTS fabricate repair parts for a wide variety of mining applications in this well-equipped machine shop. Most machine work is done in the shop.



PORTABLE LIFT handles supply and equipment in shop and supply house.



SUPPLY ROOM is connected to the central shop to eliminate lost time waiting on repair parts. One man handles supplies.



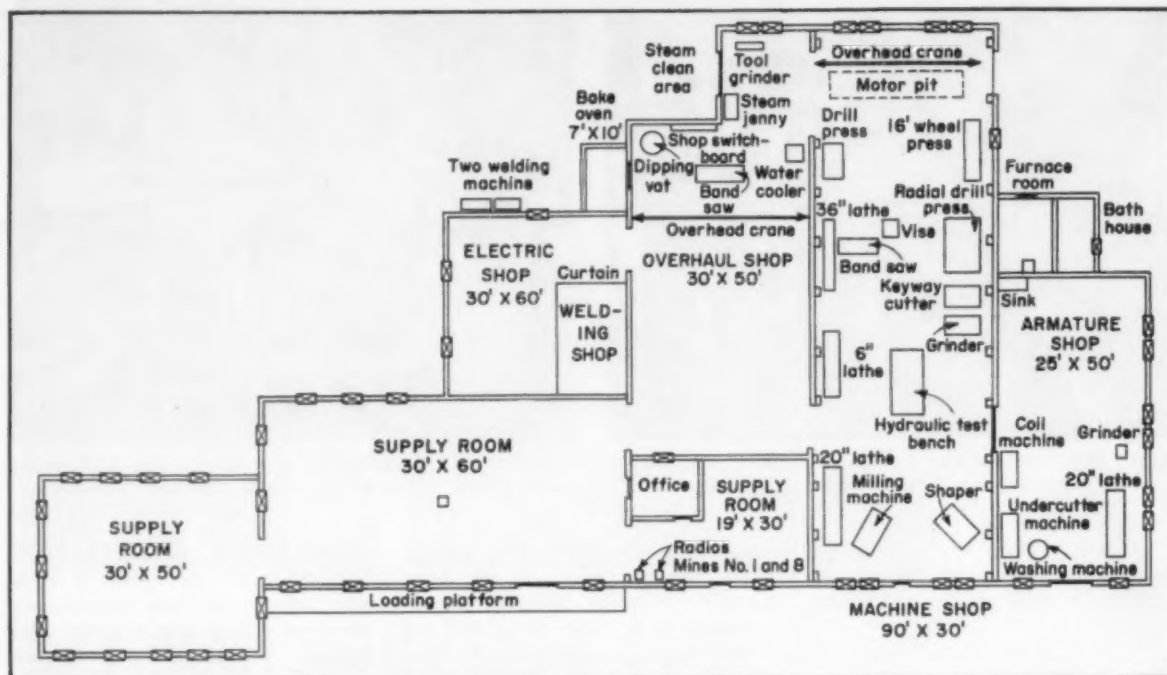
WELDING SHOP is equipped with two welding machines and fitted with curtains to protect shop personnel against eye burns.



EQUIPMENT OVERHAUL AREA contains ample space to disassemble and assemble even the largest mine machinery. A-frame hoists speed work.



ARMATURE BAKE OVEN accommodates several armatures at one time.



MAIN SHOP provides facilities for overhauling equipment including special machine work, steam cleaning, welding, forging, armature winding and electrical work. Supply house connected to the shop speeds overhaul work and reduces supply inventory.

How Central-Shop Facilities and Services Pay Off at Slab Fork Coal

With labor and materials at a premium, management is constantly seeking ways to reduce or at least stabilize maintenance costs. Numerous cost-cutting opportunities exist through the facilities and services made available by a central-shop setup. Here's how one company accentuates the positive.

CENTRALIZING SHOP WORK at Slab Fork Coal Co., Slab Fork, W. Va., the company has found, not only stabilizes overall maintenance cost but also, because of the large volume of work handled, increases efficiency, provides additional repair and maintenance skills, simplifies and reduces inventory and eliminates duplication of services and facilities.

Slab Fork mines the Beckley and Pocahontas No. 4 seams. Annual production totalled 874,847 tons in 1957. Mining equipment consists of mobile cutting machines, mobile loaders, roof drills, pumps, shuttle

cars, belt conveyors, locomotives, mine cars and rock dusters. Preparation facilities include washers, driers and sizing screens, plus associated equipment. Plants Nos. 1 and 2 have a daily capacity of 4,000 and 3,800 tons, respectively.

Shop Layout for Efficiency

The central shop at Slab Fork was designed to overhaul, repair and fabricate equipment for the mines and preparation plants. Its functions and responsibilities, as well as organization policies, were carefully

planned to blend with other maintenance groups and mine management. Consideration also was given to the size of the operation, type of equipment and type of work performed. All factors, in one way or another, influenced the final shop layout.

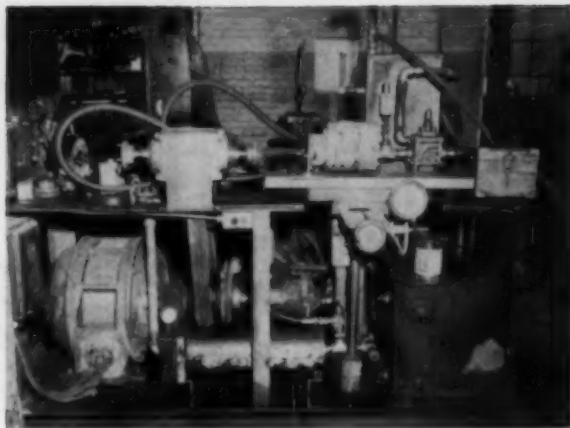
Basically, the shop is divided into nine departments or work areas, as follows:

1. Offices (chief electrician and purchasing agent).
2. Armature rewind and motor repair shop.
3. Machine shop, and hydraulic repair and test laboratory.
4. Locomotive repair pit.
5. Machinery steam-cleaning section.
6. Major overhaul shop.
7. Welding shop.
8. Electric shop.
9. Supply room.

Each area contains ample space to perform assigned jobs and is well



MACHINED PRODUCTS are stored in racks. Savings up to 50% on armatures and spline shafts are not uncommon.



HYDRAULIC TEST BENCH is a shop product. All hydraulic equipment at Slab Fork is rebuilt and tested at the shop.

equipped to turn out high-quality work. Note location and type of major equipment items on the accompanying floor plan.

The machine shop, motor pit and overhaul shop are equipped with overhead cranes. Two wheel-mounted A-frame cranes also are available to ease handling of heavy units for overhaul and repair work. A portable Yale lift is used to handle and move supplies and other small equipment items to all areas of the shop. Outside crane facilities include a swinging cantilever-type unit at the mine-track shop entrance and an A-frame structure which spans the railroad and mine tracks.

Aside from standard armature-shop equipment, such as, a 10-in lathe, undercutter, coil machine and grinder, a 7x10-ft bake oven and dipping vat are provided for insulating and reconditioning armatures of all types and sizes. The bake oven is heated electrically. The armature shop is 25 ft wide 51 ft long.

The machine shop is equipped with 36-, 20- and 6-in lathes, milling machine, shaper, grinder, key-way cutter, band saw, vise, radial drill press, standard drill press and a 16-ft wheel press. The hydraulic repair and test laboratory is also located in the machine-shop area. This area is 30x71 ft overall.

The hydraulic test bench (see photo) is a shop product. It is designed to test all types of hydraulic pumps and motors. A unique feature of the test bench is the ease at which the various types of units can be mounted for test purposes. A mounting plate is attached to a movable

bed plate so that the unit being tested can be aligned to the drive assembly. It works similar to the adjustments on a lathe.

Other work areas previously mentioned are equipped with standard and specialized equipment to speed work progress and to turn out quality. The shop is hot-water-heated from a central boiler room. Lighting is above average and features fluorescent fixtures. Shower and change facilities are provided for shop personnel.

The supply house is connected to the central shop. When supplies are needed warehouse requisitions are filled out and turned over to the supply clerk. No time is lost waiting on supplies nor is it necessary to provide storage space in the individual work areas for spare parts. "The advantages of having the supply house near the central shop are obvious from a maintenance standpoint. But in addition we need only a minimum of supply personnel and are able to do a better job of inventory control," notes F. D. Morton, purchasing agent.

Personnel Requirements

Fourteen skilled technicians are required to carry out the central-shop maintenance program:

Two armature winders.

One machinist.

One hydraulic repairman.

One welder.

Three mechanics.

Four electricians (two day shift, one evening and one third shift).

Two car-shop repairmen.

Each man is a specialist in his own field but he also is capable of doing other jobs in the shop when necessary. This adds flexibility to the work program. For example, if one department has no incoming work and another is overloaded, the men with no work step in and help the other department, thus keeping everyone busy.

The Work Program

Better than 95% of all repair, overhaul and fabricating work at Slab Fork is performed by the central-shop maintenance crew. Overhauls on all types of equipment employed by the mines and preparation plants, plus fabrication of personnel cars, oil cars, locomotives, belt feeders and some preparation-plant sheet-metal work are included in the work program.

Great savings have been realized by reproducing machine-tooled products. Savings up to 50% on such items as armature shafts, spline shafts and sprocket shafts are not uncommon with skilled machinists.

All armature and motor-repair work, including rotary converters, is performed by the two armature-shop technicians. Armature and field coils are purchased from manufacturers. However, certain types of AC coils are made on the job. "A 50% saving in our annual motor-repair cost has resulted from the 100% on-the-job motor repair program. The quality of our work can be rated on the same level as that produced by companies specializing in this work," notes L. J. Neal, chief electrician.



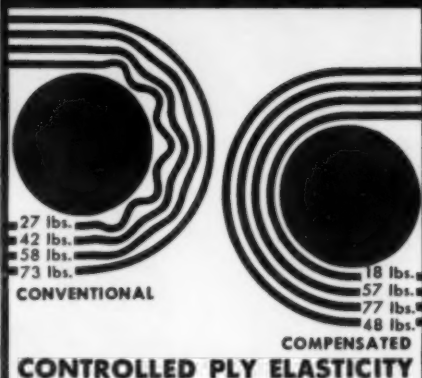
RAY-MAN CONVEYOR BELT HAULS MORE COAL, LASTS LONGER "More Use per Dollar"

Special strength members with *double compensation* to relieve stress on outer plies, give Ray-Man Conveyor Belt unusual flexibility and longer life. It trains *naturally*, troughs *easily* . . . permits fuller, heavier loads even where thick, narrow belts are used, or where pulleys are small in low-head installations. Ray-Man requires no breaker strip . . . holds fasteners under the most severe conditions, has high rip-resistance and is mildew proof. R/M's exclusive "XDC" Cover provides *real* protection against wear, tear, cuts and abrasion. Like all R/M *underground* belts for coal mining, Ray-Man is available in special fire-resistant construction with Bureau of Mines' acceptance designation: "Fire Resistant, U.S.B.M. No. 28-10."

Let an R/M representative show you how engineered features of Ray-Man and other R/M heavy duty conveyor belts add up to "More Use per Dollar" on *every* job!

For More Mine Drive Power in Less Drive Space—
Investigate patented R/M Poly-V® Drive. Write for Bulletin M141.

STRESS-RELIEF OF OUTER PLYS
MEANS LONGER BELT LIFE
"More Use per Dollar"



CONTROLLED PLY ELASTICITY

Note how Double-Compensation at right equalizes ply stresses.

1. Center plies on neutral axis and better protected carry more load.
2. Outer plies stress-relieved by adjusting to tension and compression.

INDUSTRY'S ONLY COMPENSATED BELT

Ray-Man Compensation relieves outer ply stress . . . allows outside ply to elongate more than inner plies as the belt flexes around the pulleys. Inner plies no longer "loaf", but carry full share of the load.

Outer ply is better able to absorb strain and impact of loading, pull as a strength member, protect the inner plies, hold fasteners or splice longer.

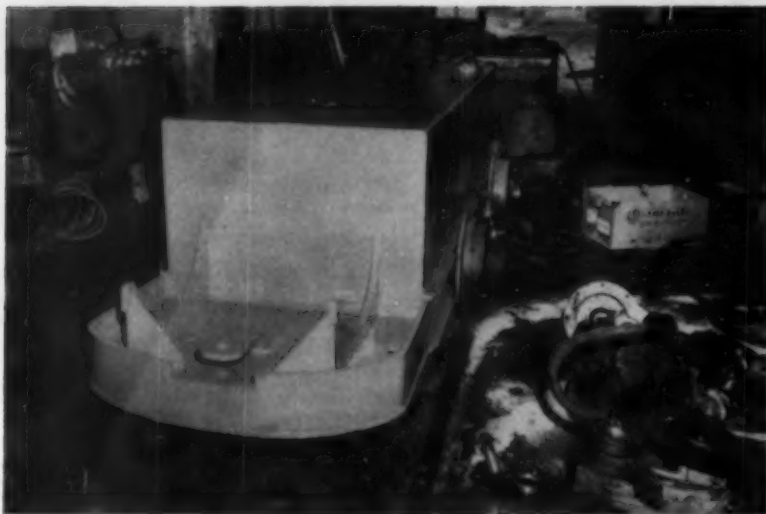
And, because Ray-Man is double Compensated—both top and bottom plies stress-relieved—Ray-Man Compensation prolongs belt life, even where operated over reverse bend, snub or take-up pulleys!

RM 812

BELTS • HOSE • ROLL COVERINGS • TANK LININGS • INDUSTRIAL RUBBER SPECIALTIES
MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY
RAYBESTOS-MANHATTAN, INC.

Other R/M products: Abrasive and Diamond Wheels • Brake Blocks and Linings • Clutch Facings • Asbestos Textiles • Mechanical Packings • Engineered Plastics • Sintered Metal Products • Industrial Adhesives • Laundry Pads and Covers • Bowling Balls





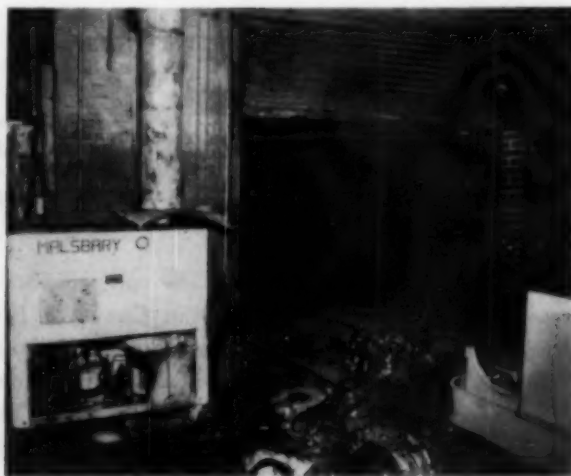
OIL CAR fabricated in the shop is used by mine service crews. Large tank is for hydraulic oil and space at each end of car accommodates other grades of oil.



PORTABLE GRINDER speeds up jobs that normally are time-consuming.



ARMATURE-SHOP TECHNICIANS rebuild motors and armatures. Technician (above) is applying glass banding.



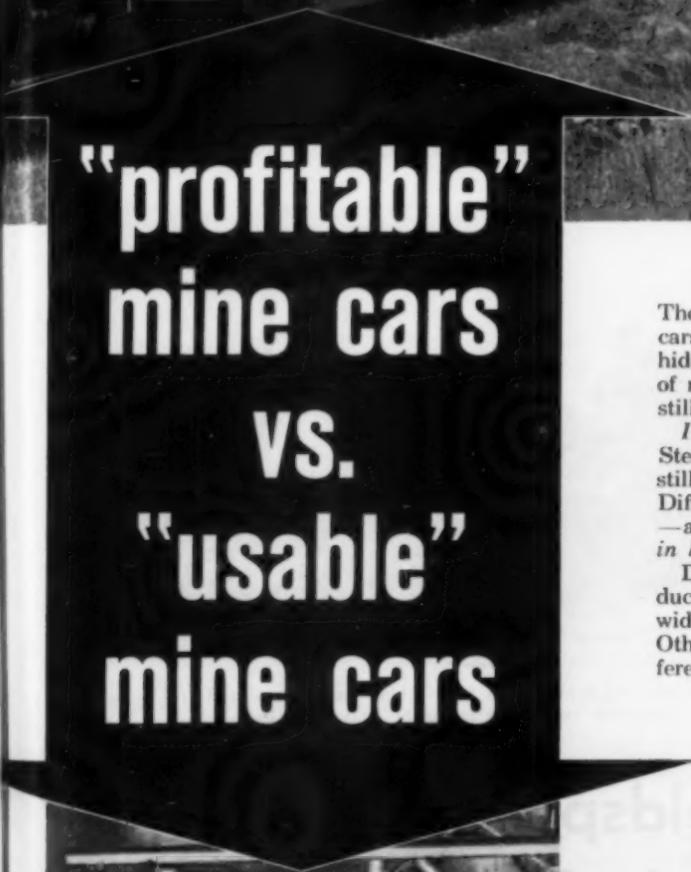
INCOMING EQUIPMENT is steam-cleaned at the cleaning area to ease handling before disassembly and repair work starts.




CHIEF ELECTRICIAN L. J. NEAL heads up central-shop activities as well as other maintenance duties.



PURCHASING AGENT F. D. MORTON controls supply inventory, supply receiving and disbursement of parts.



**"profitable"
mine cars
vs.
"usable"
mine cars**



There is a big difference between "usable" mine cars and "profitable" mine cars. One of the greatest hidden risks in coal haulage today is the high cost of retaining cars that are no longer profitable but still usable.

Illustrated on this page is a case in point. Inland Steel Company's Wheelright Mine discarded its still usable 4-wheel cars (lower left) in favor of Differential's 8-wheel cars (above) and experienced —according to their own figures—a 33% reduction in hauling costs!

Differential's patented "axless" truck design produces greater cubic capacity for any given length, width and height mine car than any other make. Other well known, superior characteristics of Differentials add substantially to the savings.

Let Differential help you map out a profit-promising replacement program starting with an in-the-mine survey. Write today. Don't delay longer!

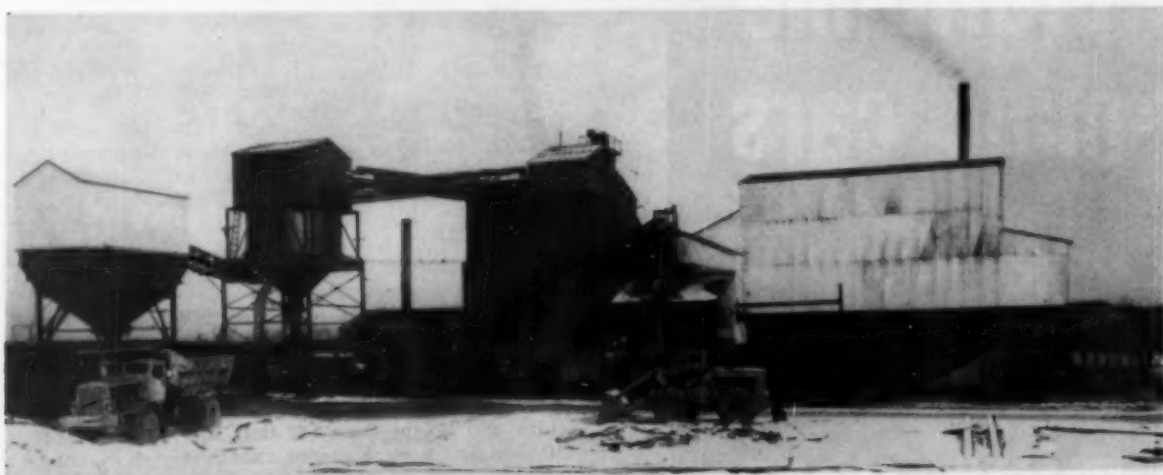


D
DIFFERENTIAL
STEEL CAR COMPANY
FINDLAY, OHIO

Trip of 4-wheel mine cars
of the type discarded by Inland.
Usable? Yes . . . Profitable? No!



AVON WORKHORSES are draglines, such as this 12-cu yd machine with 175-ft boom, shown with vertical drill, and rubber-tired front-end loaders for loading coal into trucks and other uses.



AVON WASHING AND DRYING PLANT features air-operated and feldspar jigs for washing and thermal and cyclone equipment for drying coal under 2½ in, and particularly ¼x0. All sizes can be cold-oil treated.

40:1 Ratio and Feldspar Jig Highlight Avon Strip Progress

Problems of high overburden ratio and thinness of coal dictate draglines and front-end loaders. Greater customer satisfaction assured by washing, with special attention to fines, and by thermal and centrifugal drying and oil treating.

AN AVERAGE 40:1 overburden-to-coal ratio and extremes of temperature ranging from 95 above in summer to 40 below in winter mark the operations of the Avon Coal Co., Ltd., in the Rothwell-Minto area of New Brunswick, Canada.



AVON MANAGEMENT includes (left) Superintendent Eric Andrews using two-way radio and (right) L. E. Johnston, assistant general manager, and Joseph V. Streeter, sales manager, inspecting coal treated with the new cold-oil spraying system.

Four pits and a production of over 180,000 tons annually now and 250,000 tons by the end of 1959 make Avon one of the largest stripping operations in Canada. Overburden in the four pits averages 45 ft and the maximum removed is 80 ft. Minimum is 10 ft. Thickness of the main Pre-Pennsylvania seam is 14 in. A 5-in upper seam usually is separated from the main seam by 3-in parting of glacial till.

The high overburden-to-coal ratio resulted in the selection of draglines for the majority of the pits, while the thinness of the coal made it logical to choose front-end units for loading. The thinness of the coal and the presence of the parting also were logical reasons for the adoption of washing and heat drying to insure a uniform ash and low moisture in shipments.

Avon was organized in 1917 by the Nashwaak Pulp & Paper Co., Ltd., which purchased the coal limits from J. S. Gibbon. Mr. Gibbon had operated a deep mine on the property from 1900 to 1917, but his production was small. In 1943, the property was purchased by Percival Streeter and family, of St. John, N. B., and a program of modernization and expansion was adopted. Mr. Streeter is president, treasurer and general manager. M. G. Teed is secretary and

L. E. Johnston is assistant general manager in charge of mining operations, succeeding his father, J. J. Johnston, who died in 1957. Joseph V. Streeter is sales manager.

Most of the Avon production moves over the Canadian Pacific Ry. to pulp and paper mills in the provinces of New Brunswick and Quebec and the State of Maine. Other users include the Canadian Pacific, the New Brunswick Electric Power Commission and smaller stoker plants throughout New Brunswick. As shipped, moisture usually runs 3 to 3½%, with other specifications (dry basis) as follows: volatile, 31%; fixed carbon, 54%; ash, 15%; sulphur, separately determined, 7.5%.

Washing and Drying

Avon was the first mining operation in the province to go to washing and thermal drying. As all the coal comes from four strip pits and is affected by weather conditions it was very difficult to control the moisture content of shipments. To attain the desired results a Vissac Pulso dryer was put into operation in February, 1951. This was followed in May, 1955, by a McNally Norton jig to wash minus 2½ in. This unit provided average results in excess of specifications but it was felt that the customers would

accept the ¼x0 fine coal more readily if a better job of cleaning was done. Consequently in September, 1958, a McNally feldspar fine-coal jig was added to the preparation plant, along with two McNally Dryclones for drying ¼x0. The feldspar unit has done an excellent job of cleaning. Some of the raw fines run as high as 28% ash, which is reduced to as low as 12%.

Coal is brought to the preparation plant from three pits by truck and from a fourth by railroad. It is crushed to minus 5 in, blended and screened at 2½ in. The plus 2½ in goes over a picking belt and thence to cars while the minus 2½ is wet screened to remove minus ¼. The 2½ x ¼ is washed in the McNally Norton jig, and then is dried in the Vissac dryer and rescreened to various sizes as required.

The ¼x0 washed in the feldspar jig passes over a dewatering screen to one of the Dryclones. It then can be loaded separately or mixed with any of the other sizes. Being of lower ash content it upgrades the size with which it is mixed. All sizes may be oil treated if desired using a cold-oil spray at 400 to 450 psi. Treating also helps eliminate coal freezing in addition to controlling the dust. Sizes shipped are: 5x2½, 2½x0, 1½x0, ¾x¾, 2½x¾, 1½x¾ and ¼x0.

The company's goal of always try-

ing to supply a better product has kept it busy during a period when the coal market is at a low ebb.

Stripping and Loading

Shales predominate in the bank in the Avon pits, though some sandstone layers are encountered—one in particular lying about 4 to 6 ft above the coal. Drill equipment reflects both improvements in construction and a need for flexibility to meet varying conditions in the four pits. A crawler-mounted Joy 58BH rotary making

7½-in holes is employed for deep banks with heavy rock. A truck-mounted Joy 225A rotary making 6¼-in holes is readily movable and handles much of the drilling in thin or moderately thick overburden. A 6-in Parmanco horizontal unit and a Hossfeld prospect drill round out the drill group. A Bucyrus-Erie 40R rotary making 9-in holes will be installed this summer to work with a new 500W dragline.

Depending upon thickness of the burden, vertical holes are drilled on 20- to 25-ft centers. Approximately

the same spacing is used with horizontal holes. The breaking medium is ammonium nitrate and fuel oil mixed on site and loaded into holes by the company's explosives crew. The charge is 80 to 150 lb, and detonation is achieved with detonating fuse. The normal yield is 12 cu yd of overburden per pound of nitrate.

The first stripping unit purchased by the present Avon management was a Marion 7200 walking dragline, which went into operation almost 11 yr ago and still handles an average of 1,820,000 yd per year. The second purchase was a 7400 walker with 12-cu yd bucket on a 175-ft boom. It averages about 3,000,000 yd per year. The third was another 7200 dragline, with 120-ft boom and 6-yd bucket. It averages 2,000,000 yd per year.

The fourth stripping unit is a 4-cu yd Hi-Lift Manitowoc shovel, which handles about 900,000 cu yd per year, making the total approximately 7,720,000 cu yd for around 180,000 tons of prepared coal per year. All draglines operate on 2,300-V current. The shovel is powered by a Caterpillar diesel engine.

This summer Avon will take delivery on a Bucyrus-Erie 500 W all-electric dragline with 175-ft-boom and 14-cu yd bucket. It is expected to move 3,500,000 cu yd a year and permit increasing annual output to 250,000 tons. A Marconi two-way radio system permits close contact between main office, stripping and preparation operations, and supervisory personnel to increase overall efficiency of the operations.

Coal loading is handled by front-end loaders as follows: one Allis-Chalmers HD16, one HD11 and four TL20 rubber-tired units, plus one Keystone horizontal-thrust machine. Five bulldozer units as follows work in the cuts, build roads and push inclines down into the pits: three Allis-Chalmers HD16, one International TD20 and one LeTourneau. Two of the HD16s are equipped with hydraulic rippers for breaking frozen coal.

Both coal benches may be recovered at times—occasionally by having the loaders skin off the top coal and load it into trucks while the parting is bulldozed off. If the parting is thin it and the top bench may be loaded with the main bench and sent to the washer.

THIS IS THE END OF YOUR WATER TROUBLES!

FLYGT electric pumps work round the clock with practically no supervision or maintenance. They are fully portable, fully submersible — need no priming, no installation.

FLYGT pumps can run dry without damage — take a high proportion of solids without clogging.

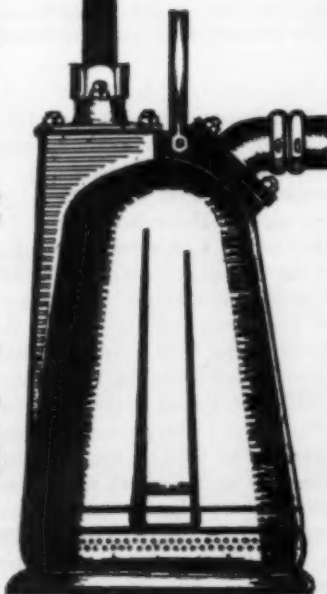
Other FLYGT pumps:

B-80L: 3" hose; 6 hp; 185 lbs; 330 GPM; max. head 170 ft.

B-80M: only 9" diameter; 3" hose; 6 hp; 140 lbs; 300 GPM; max. head 115 ft.

B-150/200L: 6" or 8" hose; 65 hp; 1,200 lbs; 3,000 GPM; max. head 220 ft.

HIGHER HEADS WITH
FLYGT PUMPS IN TANDEM.



B-38L data: 1½" hose; 1.8 hp; 79 lbs; 75 GPM; max. head 90 ft.

FLYGT

WEST OF THE MISSISSIPPI:

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CORPORATION**

Hoosick Falls, N.Y.

MEMO
TO MEN
ON THE
RISE:



WHERE THERE'S BUSINESS ACTION THERE'S A BUSINESSPAPER

One of the stepping stones to success is the ability to get the *inside word* on what's going on in your business. There's no better source for that word than the business-paper serving your particular field.

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The man on the rise, like the man on top, reads his business-paper . . . searchingly, carefully, thoroughly. Searchingly,

for information he must have. Carefully, because he's reading for profit, not for pleasure. Thoroughly, because he wants to know, *what's in it for me?* And, for these reasons, he reads the advertising with the same intense concentration he devotes to the editorial pages.

To keep on rising in your field take out your own subscription to your businesspaper. Then read every issue. Searchingly. Carefully. Thoroughly.

WHERE THERE'S
MINING BUSINESS
THERE'S . . .

**COAL
AGE**

One of a series of advertisements prepared by THE ASSOCIATED BUSINESS PUBLICATIONS

Foremen's Forum



THERE MAY BE "BUGS" in the new methods and equipment that lead to lower cost and higher efficiency. They usually can be worked out if face foremen enthusiastically tackle the problem.

Cost-Control Functions Of Production Foremen

Final execution of top management's grand plans is an important function of line supervisors. Their full cooperation is required if maximum benefits are to be achieved from good cost-control systems.

INCREASING MECHANIZATION generates some profound changes in the coal-mining industry. The continuing rush to apply industrial-engineering precepts to the production of coal is an indication of one of those deep changes. Our own definition of industrial engineering is that it is the science of planning future industrial processes on the basis of precise knowledge of today's operations. The successful mechanized mining operations of today have one mark in common; their designers and

operators know what the men and equipment can do, what constitutes a fair day's work, how to provide services and what services to provide and so on. All this information has been painstakingly gathered through time and motion studies, methods analyses, operations research and well-planned record-keeping.

It is this kind of knowledge and information that exposes shortcomings in equipment or personnel skills, or imbalance in operating cycles. Compensating steps can be taken to correct such short-

comings in minimum time, and that is why these operations are crowned with success.

In taking a first look at this state of affairs, one might be led to believe that a mine or company with a topnotch industrial-engineering setup will virtually run itself. That would be a happy situation, but it will never materialize. There will always be a key spot in the scheme of things for the enthusiastic foreman who is deeply concerned about getting a job done in the best possible manner. This is the kind of foreman who can be excited himself about the possibilities for improvement, and who can stimulate his men to a similar pitch of enthusiasm.

Getting down to more immediate cases, let's explore some of the broad factors relating to cost control and some of the avenues for its achievement which are open to face foremen.



Symbols of Strip Mine Efficiency

These huge walking draglines are representative of modern, highly-efficient strip mining methods. They are two of nine Marion machines owned by this company and help supply a major portion of the coal used by power and industrial plants of the Indianapolis area.

CONSULT

MARION

MINING SPECIALISTS

for lowest costs on your property!

MARION POWER SHOVEL COMPANY • MARION, OHIO

A Division of Universal Marion Corporation

Foremen's Forum (Continued)

Costs that are most directly affected by section operations naturally offer the best opportunity for improving company health, as far as the face boss is concerned. Major costs, of course, are outlays for labor, supplies and power along with such overhead expenses as taxes, depreciation and so on. This overhead is not ordinarily a direct responsibility of the section boss, but what he does has an effect on it, as will be explained later. In labor, supplies and power, the foreman's activities are direct and significant.

There are two ways to approach this matter of cost control. The foreman can be guided by (1) an emphasis on cutting costs for the sake of cutting costs or (2) emphasis on getting a dollar's value out of every dollar spent. Under today's conditions, characterized by slow but steady recovery from a rather painful recession, the second incentive is more desirable because it implies progress rather than curtailment. Progressive companies realize that they will have to spend money to make money in the days ahead.

The cost of labor takes most of the money earmarked by the company for operating a section. Nothing can be done about the wage scale, but in many instances the man-hours purchased by the company can be more profitably utilized. We have no thought of being impersonal or inhuman about this; it is one of the economic facts of life of the business.

Ground rules for achieving fuller use of operating time have been discussed at length in many articles, so we'll not go off on that tangent. However, it should be borne in mind that machine-hours as well as man-hours are expensive, and that real economy in labor cost demands the dovetailed effort of men and machines. The balanced operating cycle resulting from such harmony will help keep labor costs from soaring. Incidentally in working toward this happy condition, we must continually remind ourselves that men have dignity, aspirations, motives and frustrations while machines have them not.

Supplies also take a big bite from the operating dollar. Preventing waste—rather, conserving supplies—is the best way to get full value from expenditures for supplies. We prefer the term "conserving supplies" because intelligent use of materials as well as prevention of waste is part of its meaning. An operating official can eliminate much waste by hoarding supplies so that they will not be lost or damaged, but hoarded supplies add nothing to production efficiency. More to be desired is the habit of apply-

ing these materials to the job for which they were designed, while being careful to prevent abuse and misuse, two factors that limit the effectiveness of the money spent for supplies.

Right now conservation is especially important because the cost of replacement material is rising. The waste of a supply item, therefore, entails more than its original cost; the higher cost of its replacement also is wasted.

Now consider other costs not so closely associated with section operations.

Can face bosses help in sweetening the company's tax bill? They can in the sense that they can lighten the tax burden by striving for a higher percentage of recovery. Property and other taxes reflect the amount of coal in the ground, so higher recovery means greater value received for tax disbursements. Tax authorities evaluate the company's property, with the coal in place considered as part of the value. Since taxes are figured on the amount of coal in place, each ton that leaves the mine pays part of the total taxes, and the more tons that leave the property during its life the lower the tax the company pays per ton.

High recovery reduces cost per ton in another way. Mining companies spend vast sums in developing coal seams. Thereafter each ton produced as a result of that development bears some of the development cost. It follows then that if a stump containing 20 tons is abandoned the development cost for those 20 tons is lost, along with the profit that might have been realized from their sale. High extraction means more value from the money spent for development.

Now we present two examples, from true life, of how the face foreman can be the main cog in solving cost-control problems through his actions at the face.

One is taken from a conventional-mining setup and the other from continuous mining. In both instances, their actions had a profound effect on the health of their respective companies.

Officials at an Illinois mine found that shooting capacity was limiting the output of their conventional mining units. Loading machines, cutting machines, shuttle cars, coal drills and roof drills all were capable of keeping in step with the cycle upon which the desired production was based. The tip-off that shooting was delaying the operation was evident in the amount of time the loader had to wait while the coal was broken. The coal was broken with air.

A new battery-powered car, designed to permit multiple shooting with air was brought into the mine, and it was evident from the beginning that here was the potential increase in shooting capacity the company wanted. However, all new units or systems have their share of bugs which must be worked out in actual service. In this instance, top operating management of the company is loud in its praise of a unit foreman who attacked the problem with enthusiasm and made the machine fulfill its potential. He stayed with this unit as much of the time as possible, offering worthwhile ideas on possible mechanical changes, methods of operation and handling of equipment. He cooperated fully with manufacturer's service men and he encouraged his own crew, mostly by example.

He did all this in full knowledge that when the new machine reached its potential, a strain on coal-drilling capacity was almost inevitable. However, newer drills now on the market offer much hope that this strain can be handled without too much trouble. He really made the system work, and since the mine operates only two units his contribution is impressive.

The other example applies to a deep mine in Indiana, where it was felt the possible economies in continuous mining were attractive enough to warrant a trial of the method. Natural conditions left a lot to be desired, as far as continuous mining is concerned, but it was only after the machine was in place that the difficulties really became apparent. There were hard boulders in the roof, streaks in the seam and faults in the strata as a result of previous mining in lower seams. Mine officials could certainly be pardoned for giving up the idea under these conditions.

However, they stayed with their problem and worked out the bugs to achieve present averages of 37.9 tons per face man per shift in spite of all the drawbacks. The crawlers of the machine were widened and a few inches of bottom coal were left to alleviate the problems arising from the fireclay bottom. A few inches of top coal are left to keep the machine below the hard boulders projecting from the roof. The design of the rotary cutting arms was changed to provide better performance in hard coal.

Problems still remain to be solved, but the main point is that the system is working and economies have been achieved.

The lesson appears to be that face foremen, in the heyday of industrial engineering, still are the men who make the new systems work.



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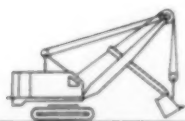
CUMMINS 450 AND 600 h.p. V-12 DIESELS

UP

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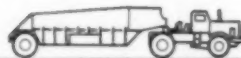
AUTOCAR
40 ton end dump



BUCYRUS-ERIE
4 yd. shovel



MICHIGAN
480 Tractor-Dozer



EUCLID
51 ton coal hauler



BERLIET
100 ton Off-Highway Transporter



KENWORTH
36 ton rear dump



K.W. DART
50 ton end dump



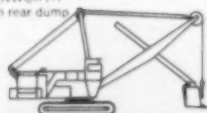
LE TOURNEAU-WESTINGHOUSE
80 ton coal hauler



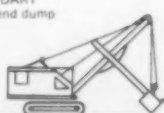
BALDWIN-LIMA-HAMILTON
4 yd. shovel



MAK
34 ton rear dump



MANITOWOC
5 1/2 yd. shovel



MARION
4 yd. shovel



M.R.S.
70 ton scraper



P. G. LE TOURNEAU
130 ton scraper



UP PRODUCTION WHILE REDUCING COSTS

Nothing can match the performance of Cummins V Diesels—the 450 h.p. NVH-12 and the 600 h.p. VT-12! When powering today's giant earth-movers, they'll enable you to handle as much as five times as many yards per hour as equipment with less powerful engines. You cut the number of units needed—reduce driver wages—minimize maintenance and repair problems.

Cummins has proven these 12 cylinder models through 10 years of on-the-job performance. Continuous engine development has produced features that save you money. Wet type cylinder liners, for example, permit quicker, less costly repair. The PT Fuel System is fool-proof and trouble-free. Cummins Dirt Proofing provides positive protection against the entrance of grit and abrasives.

If you are considering the purchase of new, larger equipment, like the scraper shown above, specify it with Cummins V-12 power. This means you'll start earning more profit right away. To aid you in selecting, the NVH-12 or the VT-12 is standard or optional power in the machines shown to the left. For more details, see your manufacturer's representative or Cummins Distributor.

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• **CUMMINS 2-INSPECTION PROGRAM**

Off-highway applications are double checked—inspected before delivery and on-the-job, in the machine. This protects your power investment and assures long operating life.

• **COMPLETE RANGE OF DIESELS**

34 models—from 60 to 600 h.p.—enable you to have Cummins power for any application. Your distributor can also repower your present machine, if you wish.

CUMMINS ENGINE COMPANY, INC., COLUMBUS, INDIANA

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OVERSEAS FACTORY — CUMMINS ENGINE COMPANY LTD. — SHOTTS, LANARKSHIRE, SCOTLAND

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COAL AG

Now...at no increase in price 40% more HP...longer service life with Gates Vulco Ropes



Gates brings you, through *Specialized Research* in V-Belts, another important cost-saving advance:

Now—at no increase in price—the horsepower rating of Gates Vulco Ropes has been increased 40%.

As replacements on standard drives, these V-Belts with 40% more load carrying ability will give longer service. Longer life reduces down-time, and cuts belt replacement costs.

And as the tag tells you: Belts labeled “Gates Vulco Rope” or “Gates Hi-Power” are identical in construction and can be used interchangeably in matched sets.

Available Now from your nearby Gates Distributor

Today, all Vulco Ropes in Gates distributor and warehouse stocks have the new higher horsepower rating.

See the Yellow Pages of your phone book for your nearest Gates V-Belt distributor.

Designing NEW Drives?

For new drives, Gates now offers you the new *Super HC V-Belts and Sheaves*—the most advanced concept in power transmission in 25 years. The Super HC Drive is far more compact... takes up to 50% less space. Costs less, too. You save as much as 20% over present V-Belt drives. Ask your nearby Gates distributor for Handbook DH-900 entitled, “The Modern Way to Design V-Belt Drives.”

The Gates Rubber Company Denver, Colorado
Gates Rubber of Canada Ltd., Brantford, Ontario



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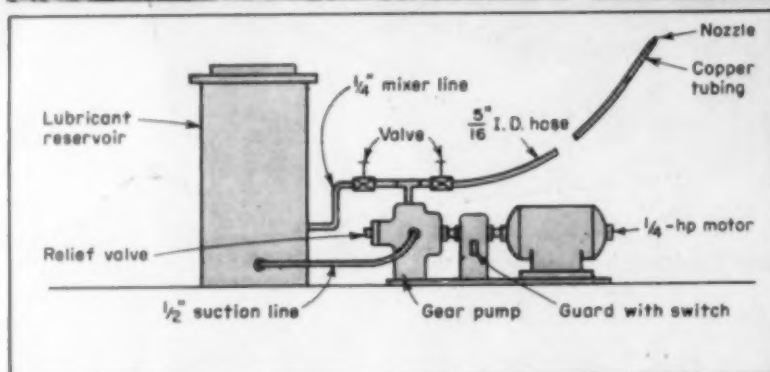
TPA-412

Gates



V-Belts

Operating Ideas



Automatic Trolley-Wire Lubricator Saves Time

LUBRICATING trolley wire is done with the flick of a switch at Hanna Coal Co., thanks to the ingenuity of Ireland mine's maintenance foreman, Eldred McCartney. He took the tub from an old foot-operated grease gun, coupled it to a small pump powered by a 1/4-hp motor, added some valves, tubing and nozzle and came up with the automatic system. The system may be installed on a mine locomotive, portal bus or jitney and may be turned on and off as the vehicle travels around the mine. It can readily be moved from one vehicle to another as it weighs only 50 lb.

The only work required to make the lubricator operable is to hook the nip to the harp of the vehicle carrying it and run the lubricator line from the greaser along the trolley pole to within less than an inch of the wire. Wire greasing can be done at any time either on shift or on an idle day. Ireland mine runs the lubricator from the 50-ton haulage motor on shift and from an open-type jitney on idle shifts. Greasing is done every two weeks.

Arrangement of the components of the greaser is as follows: a 2-gal tank with removable top serves as a reservoir. A 1/2-in suction line leads from the bottom of the tank to a 1/4-in gear-type pump. This pump is driven by a 1/4-hp 1,725-rpm DC motor. Motor operation is controlled by a simple tumbler switch and power is obtained by hanging a trolley nip on the harp of the carrying vehicle.

On the pressure side of the pump a 3/4-in line goes into a tee, thence through a globe valve on each leg of the tee. One leg of the tee connects to the tank and the other joins to a flexible rubber hose that carries the lubricant to the trolley wire. The hose is taped in position on the trolley wire so that the lubricant hits the bottom of the wire immediately ahead of the trolley shoe. A 3/8-in grease button with the end cut off and mounted in a piece of copper tubing is installed in the end of the flexible rubber hose as a nozzle. All of the Lubricator components are mounted on a 6-in channel 3 ft long. Hanna built the unit at a cost of \$108 for

material and \$30 for labor for assembly.

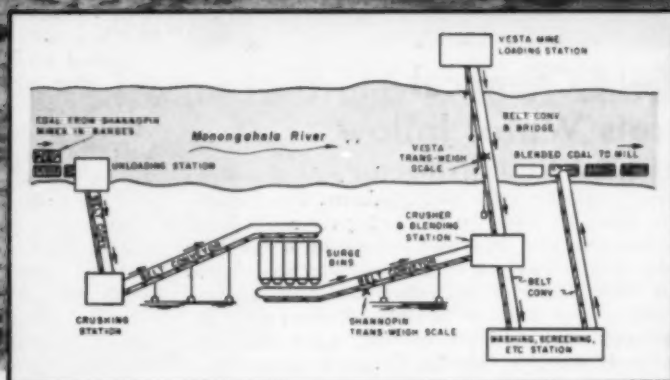
The following operating procedure is followed. Ohio Brass Type D trolley wire lubricant is mixed and poured into the reservoir. The globe valve controlling the flow of lubricant to the trolley wire is closed and the valve controlling the flow to the reservoir is opened. Then the pump motor is turned on and run for a short time to thoroughly mix the lubricant.

Next the valve controlling the flow of lubricant to the wire is gradually opened until the proper volume flows through the nozzle. If the flow is not sufficient when the valve is completely open, then the valve controlling flow back to the reservoir is gradually closed until the desired volume flows from the nozzle. There will almost always be some lubricant recirculating to the reservoir to keep the supply well mixed.

Hanna finds this method more economical than other methods because of the great saving in time. One man can lubricate 5 mi of wire in 1 hr. There is currently a patent pending on the lubricator.



CONVEYOR BELTS



(Photo courtesy Trans-Weigh Co., King of Prussia, Pa.)

COAL CROSSES THE RIVER on a belt 3870 feet long

Belt is now 11 years in service... has carried 44 million tons

The Jones & Laughlin preparation plant at La Belle, Pa., is one of the world's largest. Here the output from the Vesta and Shannopin mines is combined.

Coal from the Shannopin Mine is carried down the Monongahela River by barge. Coal from the Vesta Mine is carried across the Monongahela on a 2000' suspension bridge equipped with a 3870-foot U. S. Rubber Belt. The bridge extends from the Vesta Mine loading station to the washing and screening plant. The "U. S." Belt on the bridge (actually, all the belts in this system are "U. S.", see flow chart) blends the coal from the two mines, mixing the coal in correct proportions to produce

uniformly high-quality coal for coke production.

The belt crossing the Monongahela has been operating since 1948 and has been in continuous service all these eleven years. It has carried a total of 44 million tons so far. This belt, and the other belts in this system, demonstrate by their dependability and economy why "U. S." is the world's largest maker of conveyor belts.

• • •

When you think of rubber, think of your "U. S." Distributor. He's your best on-the-spot source of technical aid, quick delivery and quality industrial rubber products.

See "U. S." at Booth 801, American Mining Congress Coal Show



Mechanical Goods Division

United States Rubber

WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

Rockefeller Center, New York 20, N. Y.

In Canada: Dominion Rubber Company, Ltd.

Operating Ideas (Continued)



Oil-Field Chemical Controls Water Inflow

A NEW CHEMICAL COMBINATION that seals off stubborn water inflows is available to the mining industry. The chemical, a polymeric water gel, works by penetrating the capillaries of a water-bearing formation. First used successfully to seal water inflow in dry-drilled oil and gas wells, the gel later was adopted to seal off water inflow in an underground butane-storage chamber and in large shafts at an Ohio salt mine.

The new application for the water-sealing agent stems from a problem encountered by Sun Oil Co. while excavating a butane-storage cavern. Conventional grouting methods and materials were unable to halt a troublesome inflow. Cement slurry could not be forced into the relatively tight cracks in the gneiss rock.

Control Guard Prevents Accidents

AN UNUSUAL accident prompted Ernest Bonitatibus of Ireland mine to design a guard for controls on a continuous miner. A man walking by a continuous miner while it was operating accidentally bumped the controls causing the machine to move. Because the machine was sumping to cut a breakthrough, it moved quickly enough to catch the man's leg. The guard now prevents a man from accidentally hitting the controls as he walks by the machine.

All continuous miners at Ireland mine have these guards and Hanna's design has been adopted and is being installed by the manufacturer.



Better Hanger Stops Cable Sagging

A BETTER cable hanger that keeps trailing cables snug against the roof and prevents sagging is in use at Hanna Coal's underground mines. Designed with the help of Joe Turkel, mine foreman, the hanger eliminates the possibility of a lump of coal in a shuttle car with a higher than normal load striking the cable and pulling it down. Hangers are made of short pieces of steel strips which are

shaped so there is only space enough between the edge of the hanger and the roof for a cable to be slipped into place. They are bolted to the roof. A cable must be lifted to the roof before it can be removed from the hanger, Hanna uses the hangers to keep trailing cables off the mine floor and thus eliminates the possibility of their being run over by machines as they move around the section.

The problem was referred to Sun's research laboratory. Researchers suggested that the Halliburton water-control materials might be the answer. After a few experimental applications, the idea proved practical.

The gel and a special resin cement were used for the treatments. The cement was employed as a bulking agent when spaces were large enough to require filling prior to sealing. The two materials were mixed in batches within the cavern. Holes 6 to 32 ft deep were drilled to intersect the water-bearing fissures, packers then were set in the holes and the water-control agents were squeezed in and held under pressure. Injection pressures ranged from 400 to 1,200 psi. Setting of the gel was adjusted to vary from 8 min to 1 hr.

Some 600 treatments were made, varying from 3 to 800 gal each. A total of 7,946 gal of gel and 736 gal of resin cement were consumed. After 33 working days more than 95% of the water seepage had been stopped and inflow reduced to less than $\frac{1}{2}$ gpm.

Another successful application was in sealing off gas and brine inflow in two shafts dug through sandstone.

The cost of the polymeric water gel averages \$1.50 a gallon; however, the equipment and personnel charges are usually higher than the cost of the chemical. In non-oil field work, the material is supplied on a contract basis by the Halliburton Oil Well Cementing Co.

Setting time of the gel is controlled by a catalyst and temperature also has a bearing. The same is true of the resin.

Mixing techniques for the two compounds are relatively simple. The gel is batch mixed in a 55-gal aluminum tank with a paddle mixer. When resin is used it is mixed in a small steel tank. When the two chemicals are used they are mixed and injected separately, the gel being injected first.

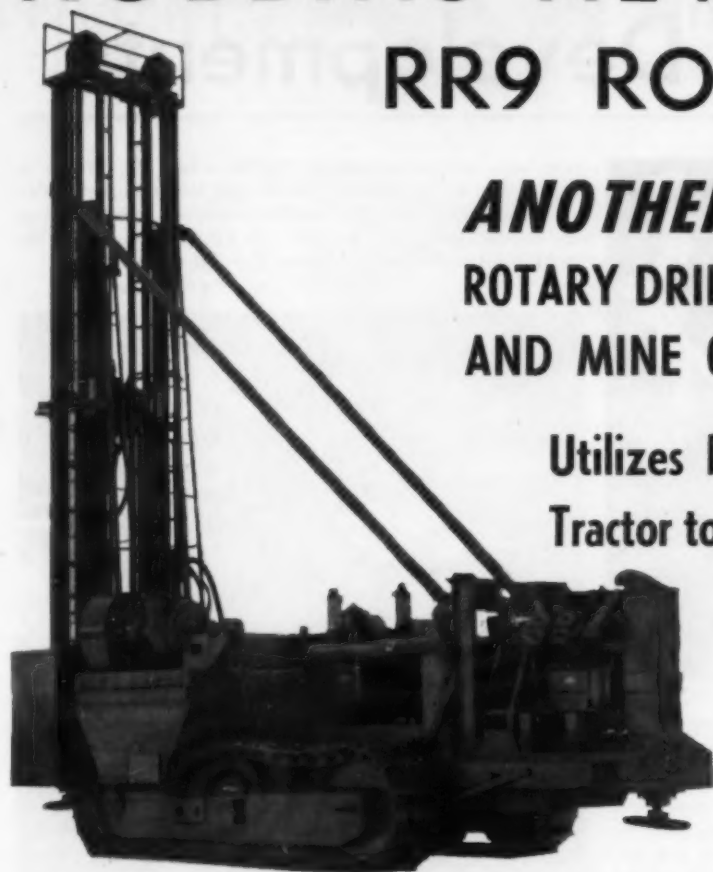
Halliburton has developed a skid-mounted grouting unit compact enough to be transported through a 40-in shaft. The pump used is a positive displacement Deming triplex unit with an air motor and transmission for flexibility.



ROBBINS NEW MODEL RR9 ROTARY DRILL

ANOTHER! NEW HEAVY-DUTY
ROTARY DRILL FOR THE CONTRACTOR
AND MINE OPERATOR.

Utilizes Power From Used Crawler
Tractor to Drill 6 $\frac{5}{8}$ " to 9" Blastholes.



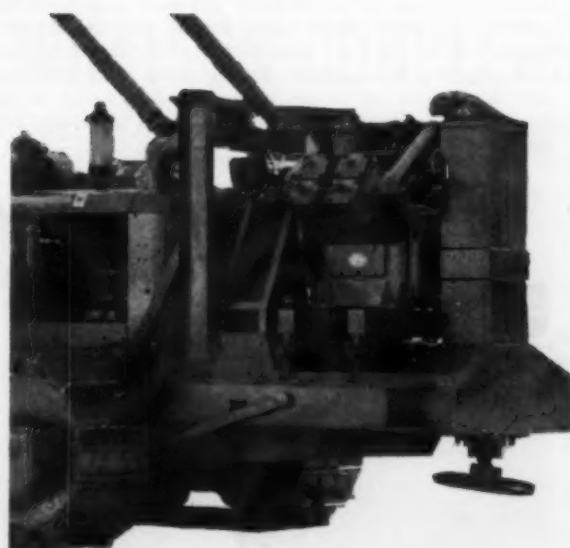
The model RR9 is a completely self-contained drill and utilizes power from the tractor engine for the entire drilling operation.

It applies up to 50,000 lbs. down pressure on the drill bit, provides convenient controls for the operator, is easily leveled on grades up to 15%. Drill mast is quickly lowered for short haul portability.

Air Compressor Driven From Tractor Front Power Take-Off.

The air compressor and major drill assemblies can be quickly installed on your used tractor.

Air supply can vary from 450 to 550 C. F. M., dependent on drilling conditions, for efficient removal of cuttings from the blast hole.



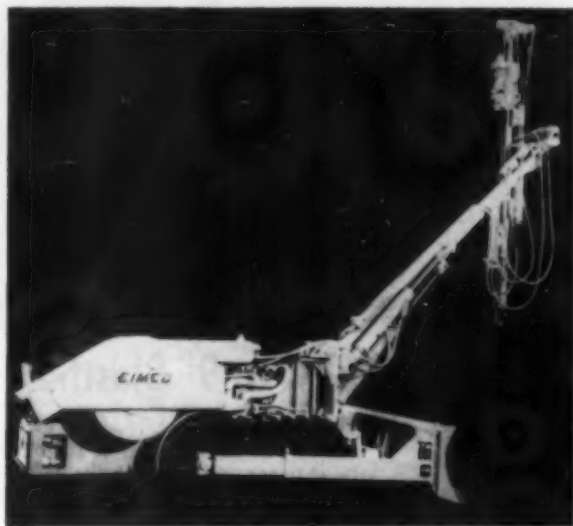
FOR COMPLETE INFORMATION WRITE TO

Robbins Machine & Manufacturing Co., Inc.

P. O. BOX 281

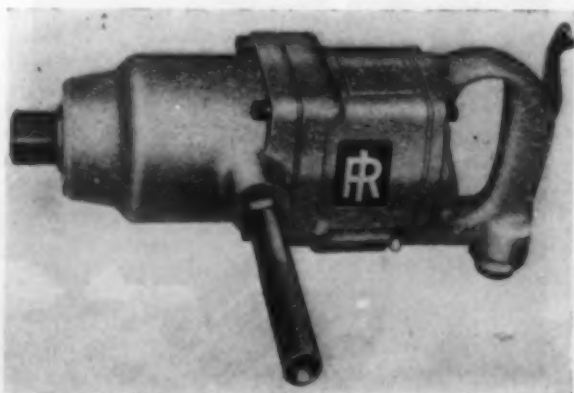
ONEONTA, ALABAMA

Equipment Developments



Dozer-Bolter

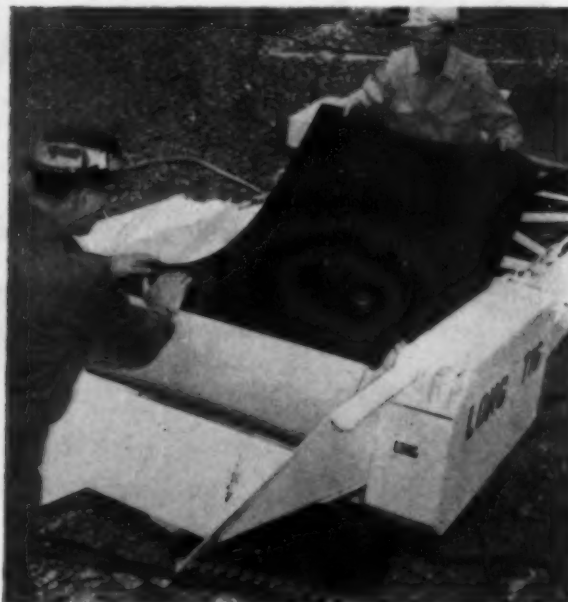
Eimco Model 637, a new electric dozer and mine-roof bolter, is now in production at The Eimco Corp., Salt Lake City, Utah. With a hydraulically operated roof bolter attachment, the dozer unit operates on AC or DC motors which drive the pumps, providing hydraulic power to independently activated tracts and to the dozer, drill boom and cable reel. A traction control valve affords three speeds forward and three reverse. Motors and switch gears have been approved for gassy coal mine use. The boom permits 50-deg lateral movements and folds back when not in use, making possible dozing in less than 5 ft of headroom. A dual-purpose dozer blade acts as a stabilizer.



"Impactool"

Ingersoll-Rand Co., New York 4, offers its new Size 834 air-powered "Impactool," said to give 25% more power in running down nuts and bolts. Direct drive between motor and hammer enables persons in production and maintenance work to run down bolts and nuts 5 times faster than before, according to the firm, thereby increasing productivity. The

new tool, with rated capacity of 1¼-in bolt size, is 6¼ in shorter than its predecessor, the Size 534 tool. Compact design and strong lightweight alloy castings for handle, motor housing and hammer case make the tool 7 lb lighter, even though the motor is larger than in the former Size 534 model.



Lagging Method

General Splice Corp., South Norwalk, Conn., has announced what it believes to be a more practical and economical way to rubber-lag conveyor pulleys. In this new "Minet" lagging method pulleys are lagged without removal from the conveyor. A Neoprene sheet of desired thickness is cold-bonded to the steel surface of the pulley with an adhesive strength of 3,700 psi and you don't need any special tools to do the job, according to the firm. Without bolts or screws the entire thickness of the lagging is used for wear, resulting in longer service life, notes General Splice. Also, the danger of damage to the conveyor belt from steel screws coming loose or exposed in a worn lagging is eliminated. The Neoprene sheet used in the method is wear, acid, heat and water resistant, it is added.

New Caterpillar Products

Caterpillar Tractor Co., Peoria, Ill., has announced two new machines. The D7 tractor with a 19.6% increase in drawbar pull provides 80% more lugging ability than the previous model in its class. The machine is the third crawler in the firm's line to be powered by a turbocharged engine, joining the Cat D9 and D8. Developing 140 flywheel horsepower, the crawler's high-power engine develops more horsepower per pound of tractor weight than any crawler in its size class, according to the firm. The second new machine from Caterpillar is the No. 933 Series F Traxcavator for digging and loading. Features of this machine are a completely new engine, stronger power train, larger-capacity bucket and an operator's compartment

- Rubber
- Mine
- Car Tr
- NACO
- NACO
- and S

EFFICIENT...



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STRONG...



VERSATILE...



PROVEN...



WILLISON COUPLERS

The Willison has only four moving parts.

WILLISON COUPLERS

No need for men to go between cars to couple or uncouple.

WILLISON COUPLERS

Coupler and head shank are one-piece steel casting with over 400,000 pound ultimate strength.

WILLISON COUPLERS

Used on all types of mine cars and locomotives; with accessories, can couple with link-and-pin hitchings; can be used with cables on incline haulage or odd pulling requirements.

WILLISON COUPLERS

Over 100,000 Willisons in service in the U.S. and overseas.

- Rubber Cushioned Units
- Mine and Industrial Car Trucks
- NACO Steel Wheels
- NACO Steel Links and Swivel Hitchings

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Cleveland 6, Ohio*

*International Division Headquarters
Cleveland 6, Ohio*

*Canadian Subsidiary
National Malleable & Steel Castings
Company of Canada, Ltd., Toronto 1, Ontario*

Equipment Developments

built for maximum comfort. Its new 4-cylinder engine is rated at 52 flywheel hp and is 350 lb lighter and 9 in shorter than previous corresponding models. In addition, it is equipped with a dynamic balancer to minimize engine vibration.



Cleaning Conveyor Belts

A new-type brush for cleaning "carryback" from conveyor belting has been developed by Osborn Mfg. Co., Cleveland. Reported to be low in cost but highly efficient, the brush has an aluminum mounting and a new synthetic fill material, Korfil "P." The manufacturer declares that this new material wears considerably longer than any other synthetic on the market. It neither absorbs moisture nor becomes brittle with extremely low temperatures, notes the firm, and its extreme ruggedness enables it to perform excellently on abrasive materials such as coal. The "Rota-Master" brush sweeps 80 to 100% of the "carryback" off the belt whereas other such cleaners are only 40 to 60% efficient, says Osborn.



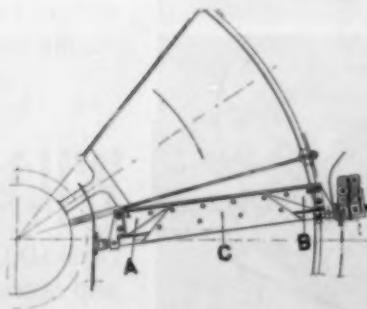
Vibration Inducer

A trackside permanent-mount vibration inducer for accelerated push-button unloading of hopper-bottom railroad cars, entrain or singly, is a new product of the Martin Engineering Co., Neponset, Ill. The shaker, says the firm, moves and keeps moving all types of bulk materials from railroad cars, even those subject to extreme "in-transit" packing and bridging. One man operates the unit without having to crawl beneath the car for any reason. Railroad cars are placed over conventional track hoppers and after the car gates are open, the vibrator head is pushed against the side of the car by a hydraulic cylinder. A push button activates drive motors and a belt-driven vibrator head generates up to 14 tons of imbalance forces.



OILLESS BEARINGS—Arguto Oilless Bearing Co., Philadelphia, announces new oilless bearing with built-in-properties. Said to perform better than any single-bearing material, Arguto-MP bearings are, according to the firm, alloys of plastic. The Arguto-MP material has many advantageous properties, declares the firm, making it possible to mold bearings to any shape, or machine to close tolerances. The material won't cold flow or melt and has high load-carrying capacity, low coefficient of friction, and excellent heat dissipation, it is added. One field test performed during a two-year testing period found Arguto-MP operating perfectly after 18 mo as pilot

bearings in centrifuges at 15,000 rpm.



NEW SCRAPER—A scraper developed by Peterson Filters & Engineering Co., Salt Lake City, Utah, is said to increase a conventional disc filter's capacity by cleaning the filter bag. The three-section Contour scraper is tensioned against the filter bag by plates which hinge independently of each other. As the bag inflates, the center section (C photo) contours out while the others are held

in place and the rubber blade contours to the bellow of the bag. This action completely discharges cake, even very thin filter cakes, reducing bag costs, lowering cake moisture and adding filter capacity, according to Peterson. The contouring action remains free and will not freeze up from sludge because all parts are sealed and lubricated, adds the company.



VOLTMETER—A low-cost all-transistorized battery-operated AC voltmeter is a new product from Motorola Inc.,

B.F. Goodrich



B.F. Goodrich Rock Service tires give coal company 30,000 miles before retreading

UTILITY COAL COMPANY operates a strip mine near Marion, Illinois. 25,000 tons of coal a month are hauled from pit to tippie over rough roads pocked with holes and large rocks. For this rugged work, Utility chooses B.F. Goodrich Rock Service tires—and no wonder. One set went 30,000 miles before retreading, has gone 8,000 miles since and has thousands of miles yet to go. Rock Service tires have minimized road delays, given maximum traction.

The Rock Service tire has a double chevron tread that grips the road in forward or reverse. The tread is specially compounded to resist rock cuts and bruises. And under the tread is the

B.F. Goodrich FLEX-RITE NYLON cord body that withstands double the impact of ordinary cord materials, resists heat blowouts and flex breaks. This is why the B.F. Goodrich FLEX-RITE NYLON cord body outwears even the extra-thick Rock Service tread, can still be retreaded.

If you want better tire service at lowest cost per mile, see the money-saving tires your B.F. Goodrich Smileage dealer has for every type of mining job. Look for your B.F. Goodrich dealer's address under Tires in the Yellow Pages of your phone book. *B. F. Goodrich Tire Co., A Division of The B. F. Goodrich Co., Akron 18, Ohio.*

Enter the B.F. Goodrich Truck Tire Mileage Contest. You can win a Thunderbird or Corvette or one of 310 other prizes. See your B.F. Goodrich dealer for entry blanks.



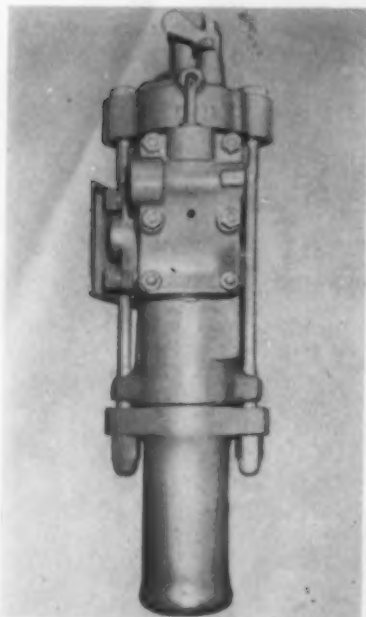
Specify B.F. Goodrich Tubeless or tube-type tires when ordering new equipment

B.F. Goodrich truck tires

© B. F. Goodrich Company

Equipment Developments (Continued)

Chicago 1. Providing laboratory performance and range combined with portability, the unit sells at \$165, has full scale readings of 1 millivolt to 300 V in 12 ranges with an essentially flat frequency response of 20 cycles to 1.5 megacycles. It has a DB scale and a "battery OK" scale.



DEEP-HOLE DRILL—A heavy-duty deep-hole hammer drill that uses conventional (left-hand) rotation as well as reverse (right-hand) rotation is new from Ingersoll-Rand Co., New York 4. A selector incorporated into the back-head permits instant changing of the rotation so the power of the drill works either for coupling or uncoupling steels, a very useful feature for efficient deep-hole work, according to the company. Model D40 has a 4-in bore and handles bits up to 3 in in dia. It is designed to be used with the Ingersoll-Rand FM-4 drill guide and can be applied to self-propelled mountings such as the Ingersoll-Rand Crawl-Ir.



FRONT-END LOADER—New TL-14 TractoLoader from Tractomotive Corp.,

Deerfield, Ill., has a 5,300-lb carry capacity and special features for speeding excavating-loading work. The 14,480-lb unit lifts up to 11,000 lb and features a breakout force up to 17,800 lb. Six buckets ranging in size from 1 to 3 cu yd can be used with the machine. These buckets with wrap-around cutting edges tip back 42 deg at ground level for fast loading. Maximum dumping clearance under the hinge pin is 10.5 in.

FORD EQUIPMENT—The Tractor & Implement Div., Ford Motor Co., Birmingham, Mich., has come out with five new products for industrial and other non-farm materials handling and earth moving jobs. Included are: a new rear-mounted reversible scoop; dozer blades with optional blade angle adapter and spring release; a Dearborn scraper, and Earthcavators.



LEVER HOISTS—Two new features are now built into all its lever hoists, according to Thern Machine Co., Winona, Minn. Lever bars and handles are provided to increase the strength and operation ease of lever hoists. A new control is located for easy turning with the thumb and one finger, permitting full control of lifting or lowering. The hoists, operating in any position, are available in 1/2-, 3/4-, 1- and 1 1/2-ton capacity.

SWEDISH PIPE—Alvenius lightweight steel pipe for compressed air and water lines is expanding its sales outside Europe into the United States market and has appointed Atlas Copco Pacific, Inc., San Carlos, Cal., as its distributor. Pipe in 2-, 4-, and 6-in dia will be available in standard 5-, 10- and 20-ft lengths. Principal advantages of the pipe from the Swedish manufacturer, A. B.

Alvenius Industries, is said to be its extremely light weight—approximately 1/3 that of standard U.S.-made steel pipe. Cold rolling has made possible the thin-wall pipe with reported strength of 104,000 psi.



DUST SEPARATORS—Torit Mfg. Co., St. Paul, Minn., has introduced a new Model 30 cyclone dust separator with an adjustable belt drive that provides a wide range of cfm performance against varying resistances. It includes a new radial blower to deliver high performance at low horsepower, according to Torit. This self-cleaning blower wheel is on the "clean air" side so bulky material and foreign objects are deposited in the base before the air reaches the fan, resulting in less chance for fan breakage.



NEW LUBRICANT—Keystone No. 88 multi-purpose lubricant is a new product of Keystone Lubricating Co., Philadelphia 32. It has application in 90% of

Quality—the best economy of all



Photo. Courtesy of Boone County Coal Corp.

Now... one *new* lubricant and one hydraulic oil meet all your daily underground needs

By teaming only two Sunoco petroleum products, miners are increasing tonnage, because they are running longer... without shutdowns for inspection and maintenance. They're simplifying their inventories and lessening the chance of mix-ups. Parts are lasting longer.

The new lubricant that makes this possible—Sun's 740A-EP—is an all-purpose, semifluid, extreme-pressure mine-machine lubricant.

It sticks like a grease... pours like an oil... resists water and heat... protects against corrosion and rust.

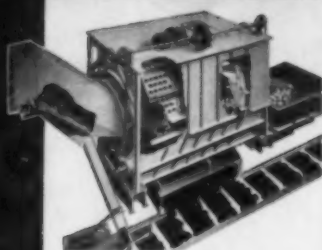
Combine new Sun 740A-EP with one of Sun's quality hydraulic oils and you have reduced your daily underground lubricant inventory to an absolute minimum. This is just one more example of how you can save money with Sun quality... the best economy of all. For information,

call locally, or write to Dept. CA-5, SUN OIL COMPANY, Phila. 3, Pa. In Canada: Sun Oil Company Limited, Toronto and Montreal.

MAKERS OF FAMOUS CUSTOM-BLENDED BLUE SUNOCO GASOLINES

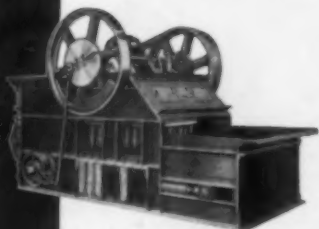


America's most complete line of CRUSHING EQUIPMENT



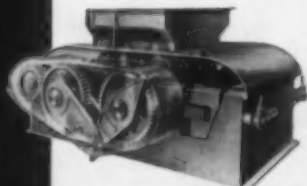
**McNally Pittsburgh
Rotary Breaker**

This unit allows positive control of top size in handling run-of-mine washery feed. Production of fines is held to a minimum.



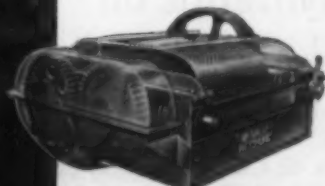
**McNally Norton Vertical
Pick Breaker**

50% less fines when reducing lump to egg and stove sizes.



**McNally Double Roll
Gearmatic ROM Breaker**

Built in tonnage ranges from 750 tph to 1400 tph. Full floating gearmatic drive.



**McNally Gearmatic Stoker
Coal Crusher**

This unit offers three prime advantages: high volume production, plus accurate sizing, plus low percentage of fines.



McNally Single Roll Crusher
Universal application 20", 24"
and 36" diameter rolls.

AVAILABLE

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For immediate action on complete information write,
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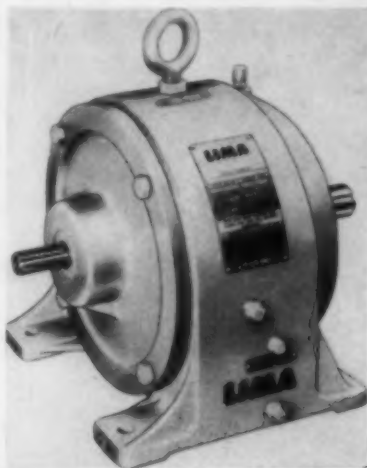
McNALLY PITTSBURG MFG. CORP.

Pittsburg, Kansas

Wellston, Ohio

Equipment News (Continued)

all ball bearing and roller bearing installations and is said to produce superior results in plain bearings, needle bearings and on rating and sliding surfaces. The product is a high-film-strength lithium-base product with powerful absorptive and water-repellent properties. With an operating temperature range of from 0 to 275 F and a melting point close to 400 F Keystone No. 88 reportedly does not thin out under heat or pressure.



SPEED REDUCER — Foot-mounted, flange-mounted or flange-mounted with extended-housing-units of Lima Electric Motor Co.'s new Straight Line speed reducers. The firm, headquartered in Lima, Ohio, says construction assures permanent and accurate alignment of shafts, gear, bearings and seals, resulting in dependable lifetime performance. All have 5.06:1 to 1478:1 ratios. Capacities of .077 hp to 147 hp and output speeds

ranging from .49 to 350 rpm are other related data.



AIR VIBRATOR—The new Navco HCP line of heavy-duty air vibrators for unloading covered railroad hopper cars has just been announced by National Air Vibrator Co., Cleveland 13. Navco HCP has an exceptionally long piston stroke for maximum amplitude and thrust, according to the firm. Units have stainless-steel mounting head for long life and have no body assembly bolts to wear out, notes Navco. The firm says an exclusive "free-ride" design gives continual effective action in contrast to conventional vibrators that tend to jam in the mounting bracket.



PIPE FITTINGS—A complete line of Plastisol (PVC)-lined pipe fittings in malleable iron or aluminum has been announced by Victaulic Co. of America, Elizabeth, N. J. With grooved ends for quick-jointing with mechanical couplings, the new fittings come in elbows, tees, reducing tees, reducers, caps and adapter nipples in sizes from 1 1/4 in to 12 in dia. All have full flow radii.

(Continued on p 134)



A 9-ft. deep undercut . . . and four 9-ft. blastholes

Kennametal U10 Cutter Bits, mounted in a Joy 11RU Universal Cutter, cut rapidly across the face, leaving a coarse slack with few fines. These bits, with narrow inserts that draw a small power load, are reground an average of 10 times.

After undercutting, four blastholes are drilled into the face, using Kennametal DL 1 7/8" Drill Bits on a Schroeder Hydraulic Drill. Completing a 9-ft. hole takes less than half-a-minute actual drilling time.

IN FIFTEEN MINUTES . . .

two men cut and drill this 18-ft. face . . . using KENNAMETAL* Bits

At the Wyatt-Seanor Mining Company, near Saltsburg, Pa., two men in each section cut and drill coal for two Joy 14BU Loaders and three shuttle cars. In maintaining this pace, where the Upper Freeport "E" Seam runs between 42-in. and 47-in. thick, it takes these two men an average of 15 minutes to prepare an 18-ft. face, from the time they start their sump to the completion of the final blasthole.

Using a conventional mining cycle—under-

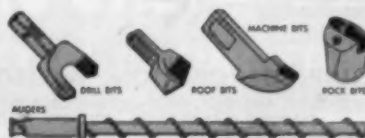
cutting, drilling, shooting and loading out—this mine realizes a remarkable shift tonnage of 32 tons for each man at the face.

Ask your Kennametal Representative how the "Yellow Bits" can improve your production. Let him help you select and actually test in your mine the Kennametal Bit designed to best match your operating conditions. Call your Kennametal Representative or write KENNAMETAL INC., Mining Tool Division, Bedford, Pa. 8767

*Trademark



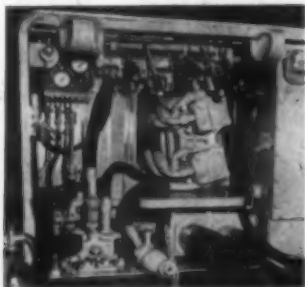
INDUSTRY AND
KENNAMETAL
...Partners in Progress



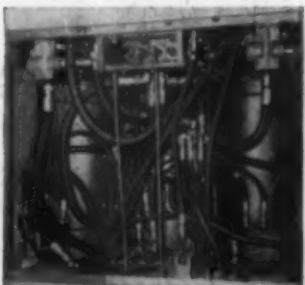


There are 37 'Dosco Miners' at Dosco's Cape Breton, Nova Scotia mine.

Aeroquip Hose Lines Add Dependability to 'Dosco Miner'



Hydraulic control lines on the 'Dosco Miner' use Aeroquip 'Hose Lines with Aeroquip Elbow Fittings.



Aeroquip High Pressure and Medium Pressure Hose Lines on the 3-pump gear case of the 'Dosco Miner'.

Continuous Mining Machine Designed by Dominion Steel & Coal Corp., Ltd., Sydney, N. S.

Digging and loading 500 tons of coal in an 8-hour shift is routine for the mechanical 'Dosco Miner'. Designed and constructed for long, rugged service, this continuous miner uses dependable Aeroquip Hose Lines for its hydraulic power and control systems.

Reduce downtime with Aeroquip Hose Lines with Reusable Fittings for replacement of all hydraulic, lube oil and air lines. It takes only minutes to make up quality hose assemblies using ordinary bench tools. Get full details from the Aeroquip Distributor listed in your Yellow Page Phone Book, or write us.



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AEROQUIP (CANADA) LTD., TORONTO 19, ONTARIO
AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN U.S.A. AND ABROAD

Equipment News (Continued)



TRACK GUARD—A new track guiding guard is now standard on the D9 tractor, reports Caterpillar Tractor Co., Peoria, Ill. Mounted on the lower inside rear of the D9 final drive case, the guard prevents dirt, rock and other material from entering the sprocket and track assembly. A beveled strip on the front of the guard directs material away from the rear of the track roller guard. These components increase track life by adding substantially to protection, according to Caterpillar.

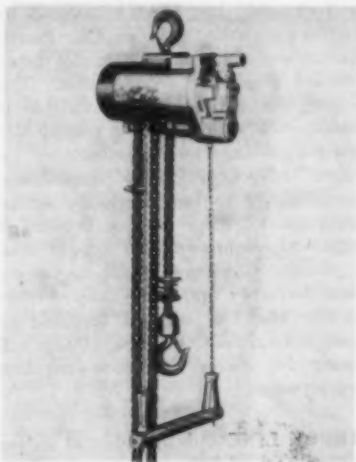


SPEED REDUCERS—A new line of high-efficiency high-capacity heavy-duty worm-gear speed reducers feature unusual flexibility in mounting and drive arrangement, according to Philadelphia Gear Corp., Philadelphia 7. Other basic improvements noted include: availability from stock of all ratios from 5 1/4:1 to 1212:1 with center distances from 3 to 21 in and any horizontal or vertical drive arrangement, and torque control.

HARD-FACING ELECTRODE — A high alloy hard-facing electrode with high resistance to extreme abrasion, medium impact and high compression loads, is a product of Stoddy Co., Whittier, Cal. According to the firm, the material has been most successful on all types of earth-working equipment such as shovel buckets and teeth, crushers and other parts taking tough wear. The company states the new rod has excellent arc characteristics on AC and DC, straight or reverse polarity. Stoddy 2134 comes in 5/32 and 3/16 in dia, 14 in

Equipment News (Continued)

length; or $\frac{1}{4}$ and $\frac{3}{4}$ in, 18 in length.

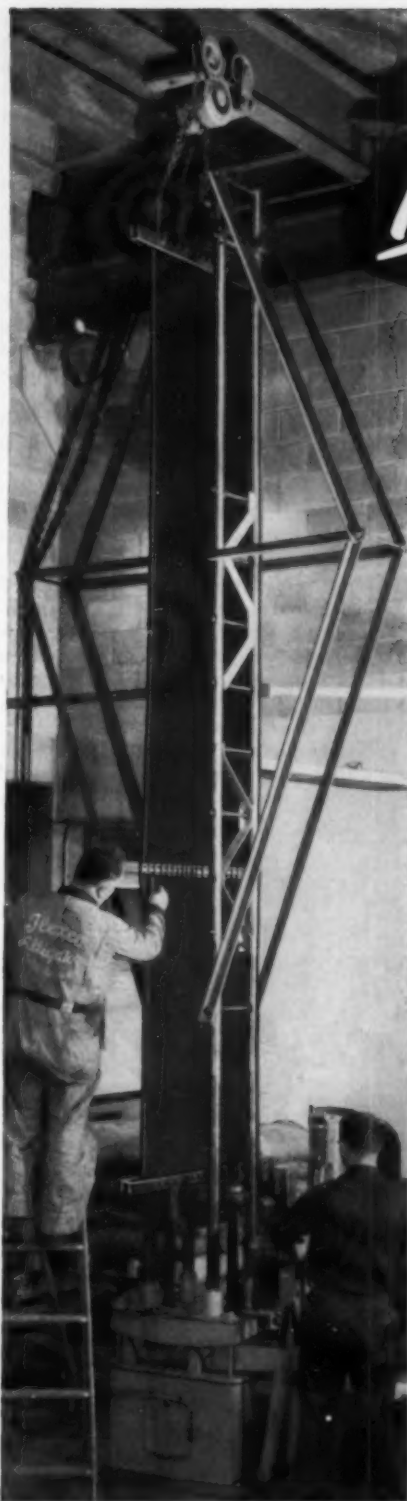


PORTABLE HOIST—Two new light-weight portable air hoists have been developed by Ingersoll-Rand Co., New York 4. A 1,000-lb-capacity hoist weighs 39 lb and lifts its rated load at 45 fpm while a 2,000-lb hoist weighs 56 lb and lifts its rated load at 22 fpm. The hoists are streamlined in appearance and feature a mechanically-operated brake that is automatically applied whenever the controls are released, resulting in increased safety for the operator.

DRILLING EQUIPMENT—Brunner & Lay-Eastern, Inc., Franklin Park, Ill., is marketing a complete new line of rope thread carbide Rok-Bits; Carbo-Rok sectional rods; couplings and striking bars. The new equipment line is intended to meet with the problem of increased length of blast holes drilled.

NEW "PAYLOADER"—The Frank G. Hough Co., Libertyville, Ill., has just announced the addition of a new Model H-120 to its line of rubber-tired, four-wheel-drive "Payloader" tractor-shovels. According to the manufacturer, this unit has the highest dumping clearance, longest reach and the most powerful engine of any tractor-shovel of its size and capacity range. The maximum height of raised bucket is 19 ft-2½ in with clearance to center of hinge pin, 14 ft-7½ in. With the bucket dumped at 50 deg, clearance under the bucket edge is 10 ft-10 in and the forward reach from the front tire is 3 ft-6 in. The new machine is powered by a turbo-charged Cummins NRT-6-BI diesel engine that develops 300 hp at 2,100 rpm. Optional engines will be available in the future. The manufacturer's recommended load "carry capacity" is rated at 12,000 lb with buckets of 3- to 6-cu yd capacity.

(Continued on p 136)



(Full details on this Test available on request)

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Equipment News (Continued)

NEW ELECTRODE—A new electrode with iron powder added to the coating increases the deposition rate over ordinary E6012 electrodes. Hobart 12A, product of Hobart Bros. Co., Troy, Ohio, is designed for welding mild steel in the flat, vertical and overhead positions on high-speed production work and is well adapted to lap seam welds because of lack of wash-back and gouging at high amperages, according to the manufacturer. Hobart 12A works better on DC, straight polarity, however good results can be obtained with AC, notes the firm. It is available in $\frac{1}{8}$ and $\frac{5}{32}$ in dia. in 14 in lengths; $\frac{7}{16}$ in dia. in 15 in lengths; and $\frac{7}{32}$, $\frac{1}{4}$ - and $\frac{5}{16}$ -in dia. in 18 in lengths. Standard containers are 50 lb each.

WORK-SHOE SOLES—Oil, grease, battery acid and other enemies of work shoes face rugged resistance in "welded-on" neoprene soles which have no stitching to wear out, rot or carry moisture through to leather linings, says E. I. DuPont De Nemours & Co., Wilmington, Del. Neoprene has been used before in shoes, says the firm, but in the new shoes soles and heels are vulcanized as one unit in a lasting bond directly to

the leather uppers without stitches or seams to allow seepage. In addition, it is noted, the construction eliminates the gummy filler used between conventional soles and insoles, removing the cause of lumps inside the bottom of shoes.

VOLT-AMP TESTER—For the first time, reports the Amprobe Div., Pyramid Instrumentation Corp., Lynbrook, N. Y., the Amprobe Junior is available in safety yellow to conform with standard safety practices. The Amprobe Junior is a snap-around, volt-amp tester that measures current instantly without shutdowns or ammeter connections. Accuracy of both voltage and current readings is plus or minus 3% of full scale. Readings are obtained on a full size 1.8 in calibrated scale.

TIRE SPUDS—A line of oversize tire spuds, designed for use with a swivel stem that fits both tube and tubeless tires on off-the-road equipment has been announced by the Dill Mfg. Co., Cleveland 15. Designated SP-4000, the new spud permits the use of tubes in tubeless tires and also simplifies inventories by eliminating a stock duplication of both tube and tubeless valve stems, says the manufacturer. Tire mounting is reported easier and faster with the new spud through elimination of interference from

an awkward stem. It also makes inflation and deflation as much as 10 times faster, adds the company.

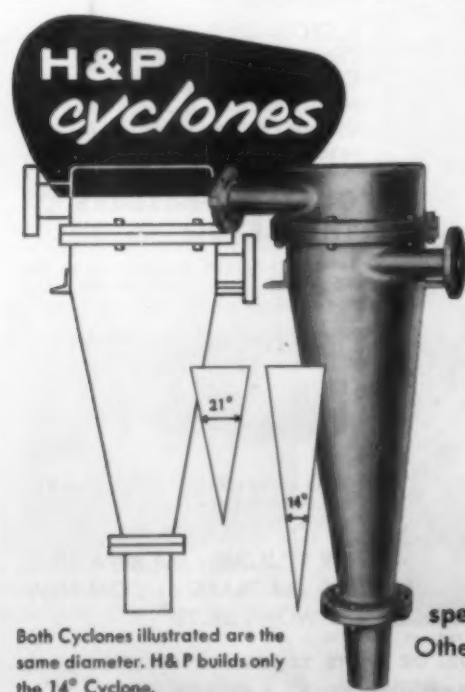
"TOURNAPULL"—A new 360-hp Model B Tournapull has been announced by LeTourneau - Westinghouse Co., Peoria, Ill. Its new engine is a GM diesel turbo-charged 6-cylinder 2-cycle diesel. This engine, the GM6-110T, is available in combination with either the special Allison torque-converter transmission or the newly offered step-gear transmission. According to the engineers, the engine gives greater power output because of improved compression and exhaust characteristics. Company officials point out that the other optional 335-hp engines in the Model B are still available for normal conditions, the new 360-hp unit being for those conditions requiring more power.

TRUCK LINE—Advancement in styling, power and pickup body designs have been combined with a high degree of truck-to-job model specialization in a new line of International trucks introduced by International Harvester Co.'s Motor Truck Div., Chicago 1, according to reports. The overall truck line, said to be the most complete in the world, includes vehicles ranging from 3,800 up to 100,000 lb. Designated the B-line, these new light, medium and heavy-duty trucks are available in 4-, 6- and all-wheel drive, with 6-cylinder or V-8 engines and a wide choice of conventional and compact-design models. A new "Bonus-Load" pickup body with 25% more cubic capacity also has been announced, and new frames with greater strength and stability are featured in certain light- and medium-duty models.

SWEAT ABSORBERS—Two models of sweat absorbers for increasing worker efficiency are reported available from Mine Safety Appliances Co., Pittsburgh 19. The Coolband, held in place on the wearer's forehead by an elastic band, does not interfere with glasses or goggles, says the firm. The second, called the Cool-Ur-Hat, is designed for use with safety hats, welding helmets and face shields. A non-metallic (plastic) fastener folds of the head band of the hat and snaps in place to keep the sponge absorber in a fixed position. Both sweat absorbers are made of soft, light, highly absorbent cellulose sponge which clings without binding, adds MSA.

TRACK SHOES—International Harvester Co.'s Construction Equipment Div. says new track shoes on the International TD-24 have resulted in a 51% increase in beam or bending strength. This is due to blending of new material, a heavier grouser and a revised heat-treating pattern, according to the manufacturer.

(Continued on p 137)



Both Cyclones illustrated are the same diameter. H & P builds only the 14° Cyclone.

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The important figure is

14°

See for yourself how much more cyclone you get when you buy the 14° H & P Cyclone. If headroom is at a premium, it can be installed at any angle, even upside down. It gives top performance and processes more gallons at lower pressure.

To thicken and classify economically and efficiently, specify the 14° H & P Cyclone. Others have—for over 10 years.

Equipment Shorts

Detector—The Brunt Faultfinder distributed by Parr Mfg. Corp., Newark, N. J., has been lightened by 33½%. The machine, combination ground detector and fault locator, is said to quickly locate accidental grounds on AC and DC power systems, up to 600 V, making it unnecessary to close down power supply, cutting maintenance costs.

Battery Chargers — Silicon battery chargers with a variety of new features have been announced by the Acme Electric Corp., Cuba, N. Y. These single-phase chargers, called "Magnistrol," are designed for float-charging battery installation ranging from 10 cells to 63 cells in five basic amperage capacities in three voltage ranges. The units are adjustable for charging lead acid, nickel-alkaline or nickel-cadmium batteries. Three-phase input chargers are also available for larger-capacity installations.

Track Improvements—Two track improvements on its crawler tractor line have been announced by Caterpillar Tractor Co., Peoria, Ill. A track link with greater wear-resistance and strength will be on the D6 tractors, No. 977 Series D and No. 955 Series E Traxcavators. The new shoe's rail thickness is increased ¼ in, putting 44% more steel in the wear zone. No. 977 Series E Traxcavator will now have a triple-grouser track shoe with high bending resistance, low turning resistance and minimum track slippage, according to the company.

Welding Copper—Burndy Corp., Norwalk, Conn., has exclusive sales rights to the "Thermoweld" process for welding copper electrical connections without external power or heat. According to the firm, the method requires inexpensive equipment and materials designed so that even an inexperienced operator can weld a perfect connection every time. Connections can be made of copper to copper, copper to steel, and once welded they will not corrode or loosen under any condition, reports Burndy.

Compressor—Ingersoll-Rand Co., New York 4, has added a 250-cfm size to their Gyro-Flo compressor line. The new Gyro-Flo 250, with a new-type compressor system said to provide nearly 20% more capacity despite its greater compactness, replaces the Gyro-Flo 210. The new machine offers a choice of two compressor-matched drives and is available with 2 or 4-wheel mounting, or

Just off the press!

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BELT
CONVEYORS**

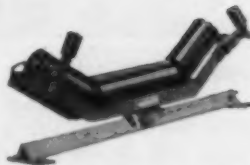
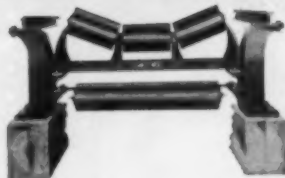
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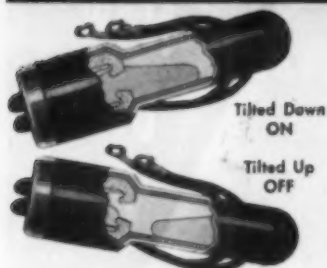
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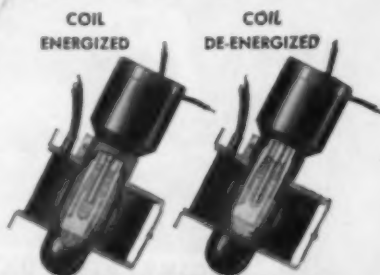
For more information on timer-relays and switches, write:

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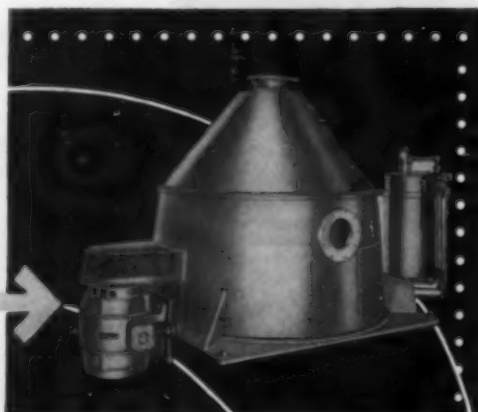
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Equipment News (Continued)

without running-gear for truck or skid mounting.

Wall Bracket—A new pump-support wall bracket designed to hold a lubricant pump off the floor while drums are being changed has been developed by Lincoln Engineering Co., St. Louis. The 16-gage sheet steel bracket is zinc-plated to resist corrosion. It eliminates need for pump elevators or hoists, according to the firm. The operator merely hooks the drum cover flange on the bracket while he slides in a fresh drum of lubricant. Because the pump tube is held free off the floor it cannot be contaminated by dirt.

Free Bulletins

Diaphragm Pumps—A redesigned line of diaphragm pumps in the 1½ to 4 in size range is available from Barnes Mfg. Co., Mansfield, Ohio. Pumps with capacities from 3,500 to 6,000 gph at 5-ft lifts are designed to handle almost all sewage and dewatering applications while offering all the convenience and economy of compact lightweight pumps, according to the firm. All models feature rubber-faced swing-type flap valves and replaceable discharge valve seats which provide free passage of solid foreign materials.

Explosives Bag—A new 8-p booklet titled "13 Questions & Answers," has been prepared to illustrate and describe new explosives bags made of Flexiply (crinkled kraft paper) tubed around Bemis-extruded pinhole-free Red Line polyethylene. Bemis Bro. Bag Co., General Sales Dept., 408 Pine St., St. Louis 2.

Dryer—Heyl & Patterson has just released Brochure 159 describing the new H & P Fluid Bed dryer which, according to the firm, is enjoying unqualified acceptance. It is noted that fluidization provides optimum conditions for efficient heat transfer and uniform moisture evaporation. Write to 55 Fort Pitt Blvd., Pittsburgh 22.

Flight Conveyor—A new data sheet describes the Type C, fully enclosed and preassembled flight conveyor for coal handling. Built in standardized sections, various combinations of prefabricated sections are adaptable to any length, profile or type of coal-handling service. Daniels Co., 22 N. 5th St., Indiana, Pa.

Piston Rings—You can get a booklet from Piston Products Inc., 8125 N. Lawndale Ave., Skokie, Ill., that handles the Daros line of piston rings, rod pack-

Equipment News (Continued)

ings and cylinder liners for diesel engines. Descriptions of all types of rings for every make and model of foreign and domestic diesel engines are included.

Wire Rope—Blue Book of wire rope is 190-page brochure with finger-tip index. Extensive information on Lang Lay and Regular Lay, "preeming," inspection, correct spooling, maintenance, etc. Free to wire rope users, you get it by asking for G-16 Blue Book, Macwhyte Wire Rope Co., Kenosha, Wis.

Rims, Wheels — Picture-filled catalog gives information and engineering data on Goodyear rims, wheels, tools and rim accessories. Discusses step by step procedure for mounting and demounting rims, gives operating instructions for hydraulic tools and discusses rim research. Write to Metal Products Div., Goodyear Tire & Rubber Co., Akron 16, Ohio.

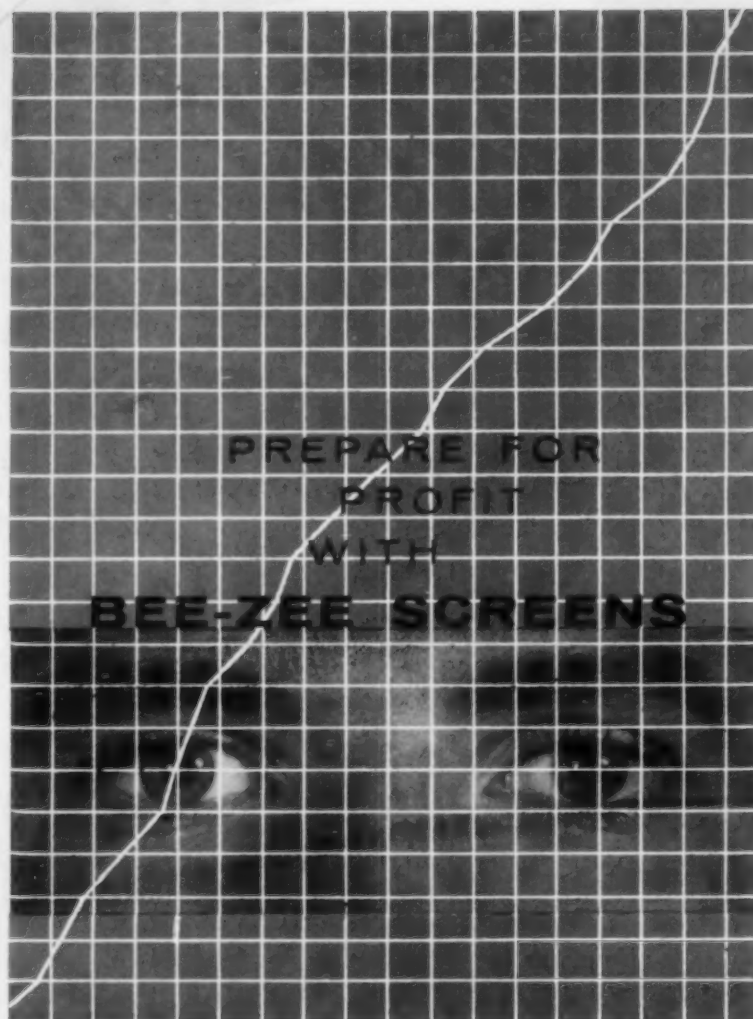
Coal Stokers—A 12-p booklet with information of the Series 401 pneumatic spreader coal stokers has been reissued by Iron Fireman. Stokers automatically meter, dry, preheat, convey and fire all sizes of coal from dust to 2-in top sizes and all grades from lignite to best bituminous, according to firm. Booklet No. 2530, with cutaway views, installation photos and diagrams, Iron Fireman Mfg. Co., 3170 W. 10th St., Cleveland 11, Ohio.

Metal Drainage — Six-page bulletin features facts on metal drainage structures. Contains data on products, sizes, gages, weights and loading, with tables and illustrations. Product Information Service, Armco Drainage & Metal Products, Inc., Middletown, Ohio. Ask for CMS-10258.

Flotation Equipment — New booklet available from Wemco describes flotation equipment; also discusses principles of flotation process for selectively separating finely divided mineral particles.

Equipment Line—Martindale Electric Co., 1312 Hird Ave., Cleveland 7, offers its latest most complete catalog with detailed information for selecting and ordering 110 different products. These include metal-working saws, rotary files and burs, test instruments, safety equipment and many electrical and maintenance items.

Revised Booklet—Falk Corp., Milwaukee, Wis., has revised its Bulletin 3100, a comprehensive product booklet with the complete line of Falk "All-Motor" and integral "Motoreducers." Revisions include changes in selections, dimensions



Product preparation is the strongest single influence on your weekly sales, monthly volume and annual profit. If ordinary screens are giving you ordinary product quality, find out how Bee-Zee Screens are the difference between problems and profit.

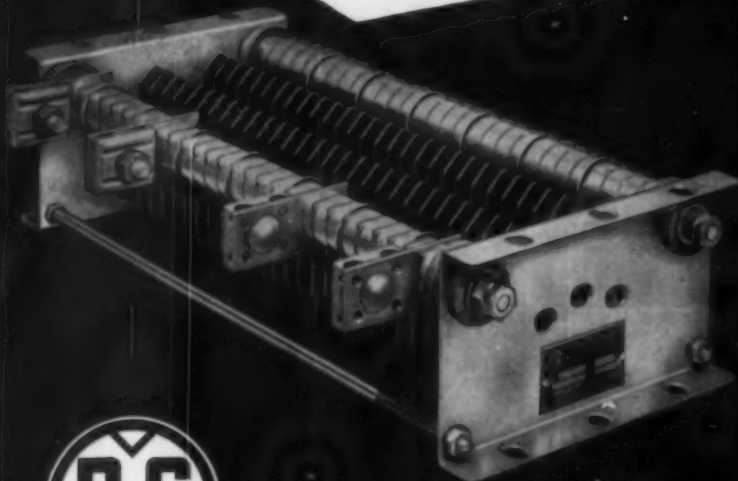
Bee-Zee Screens make you money through sharper sizing, better dewatering and deliquifying, non-clogging action and resistance to abrasion. They are stainless steel, precision welded to form the right size, right shape and right dimension screen for your operation and equipment. Talk to your screening equipment manufacturer about Bee-Zee Screens. Or, write, wire or phone DIckens 2-5154 collect.

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Equipment News (Continued)

and weights to incorporate rerated NEMA standard motors from 1 to 75 hp. Dept. 225, Box 492.

Shuttle Car—A 27-in high shuttle car with six wheels and capacity of 4½ tons is described in 8-p bulletin NJ-210. Besides data on the cars the bulletin includes action shots of the car in low coal, complete specifications, and diagrams and cutaways of the steering system, guiding-wheel suspension and center-hinge features. Joy Mfg. Co., Pittsburgh 22.

Air Conditioner—How the "Kab Kooler," a new self-powered, self-contained truck-cab air conditioner, makes the driver's cab the "most comfortable spot on the road," is told in a 4-p folder just released by D. W. Onan & Sons, Inc., Minneapolis, Minn. Installation and servicing are also handled in this 4-p folder.

Weighing, Control—"Belt-Meter Continuous Weighing & Controlling Systems" is a new booklet from Trans-Weigh Co., King of Prussia, Pa. It describes a complete line of equipment used for automatic process weighing and control and also inventory weighing.

Tablet Dispenser—Two new dispenser models, one with a 1,000-tablet capacity and the other holding 500 tablets, are discussed in an illustrated Bulletin 0408-15. Made of high-impact styrene, the dispenser is factory sealed to keep out dust and moisture and features an exclusive mounting device described in the pamphlet. Mine Safety Appliances Co., 201 N. Braddock Ave., Pittsburgh 8.

Traxcavator—Design improvements, increased power, performance and work capacity of No. 933 Series F Traxcavator are subjects treated in Caterpillar's new Form 33286. The brochure points out how new features combined with retained production-boosters, add up to more cycles per hour, yards per day and profits per job. Advertising Div., Caterpillar Tractor Co., Peoria, Ill.

Liner Plates—Manual T1-7858 from Armco Drainage & Metal Products, Inc., Middletown, Ohio, describes tunneling practices with the firm's liner plates. Different applications are discussed, engineering data given, with tables, graphs and typical installations rounding out the booklet.

Fire Protection—A new 6-p folder titled "A Guide to Fire Extinguishers" has been issued by Ansul Chemical Co., Marinette, Wis. Tables and graphs compare characteristics and effectiveness of various types of extinguishers.

Among the Manufacturers

Schroeder Bros. Corp., manufacturer of mining machinery and hydraulic testing equipment, has opened a warehouse in Logan, W. Va.

A complete line of replacement parts for the firm's equipment will be stocked at the location which is to be supervised by Randall O'Neil.

Aeroquip Corp. has appointed the following distributors to supply its industrial products locally:

Joint & Clutch Service, Inc., Indianapolis 22, Ind.; Reliable Rubber Products Co., Dayton 10, Ohio; and R. L. Miller Co., Pittsburgh 16, Pa.

General Electric Co. is combining its Lynchburg, Va., Communication Products Dept., which makes two-way communication systems for the mining industry, with the Technical Products Dept. of Syracuse, N. Y.

The latter department makes military communication equipment. Harrison Van Aken, general manager of GE Communication Products Dept., will head the combined unit with headquarters at Lynchburg.

The Yale & Towne Mfg. Co. has appointed a new distributor for its Trojan tractor-shovel line in Pennsylvania.

Equipment & Supplies, Inc., Pittsburgh, will handle the entire western half of the state for the Trojan line.



Joseph C. Hume has been promoted to district manager of the Airdox Cardox Products Co. for the southern West Virginia area.

Active in the coal mining industry since 1935, Mr. Hume had been with the Clinchfield Coal Co. and the Blue Diamond Coal Co. before joining Airdox in 1949.



John P. Lytle has been named manager of engineering, Safety Products Div., Mine Safety Appliances Co.

Mr. Lytle, who joined Mine Safety in 1953, is a graduate of the University of Pittsburgh with a degree in mechanical engineering.

Eugene P. Berg is the new general manager of Link Belt Co.'s Chicago operations. Mr. Berg has been with the company since 1937.

Roy L. Waramaker has been chosen district manager for the Boston Woven Hose & Rubber Co., Div. of American Bilrite Rubber Co., Inc.

Mr. Waramaker has had 26 yr of experience in the industrial rubber field.

W. Julian Parton has been elected vice president, operations, of The General Crushed Stone Co.

Since coming to the company in 1955 Mr. Parton has been assistant to the

president and a member of the board.

Richard H. Koehler has been appointed general sales manager of the Le Roi Div. of Westinghouse Air Brake Co.

Mr. Koehler moves into this assignment from the staff of the president of Westinghouse Air Brake Co.

Chelsea R. Phillips has been selected for district sales manager in Chicago for the Robins Conveyors Div. of Hewitt-Robins, Inc.

Mr. Phillips holds degrees in chemical engineering and business administration.



Wayne H. McGlade has been named product development manager—earth-moving and related equipment, for LeTourneau-Westinghouse Co., Peoria, Ill.

Mr. McGlade, formerly assistant to the

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EXPLORATION FOR MINERAL DEPOSITS
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TO
UNIFORM
FINE SIZES



Uniform product size with minimum fines is achieved by a non-fluctuating opening between the rolls during crushing. Low in cost and extremely sturdy, the popular Black Diamond Roll is effective in reducing coal, coke, cinders, lime and similar materials. *Features:* Rapid roll-setting adjustment, effective tramp iron protection, wide range of sizes and roll types. *Write for Bulletin.*



**BLACK DIAMOND
DOUBLE ROLL CRUSHER**

McLANAHAN & STONE CORPORATION
250 Wall Street • Hollidaysburg, Pennsylvania

Manufacturers (Continued)

executive vice president, has been with the firm since 1936.

Sheldon K. Howard has been named Diesel Div. manager for Fairbanks Morse & Co.

Mr. Howard is a University of Maine graduate with a B.S. degree in mechanical engineering.

Herman R. Brown has been appointed sales manager, Payloader Div., for The Frank G. Hough Co.

Mr. Brown has been associated with the firm for 14 yr and was formerly western regional manager.



John W. Williamson has been appointed Pennsylvania sales agent of coal and percussion bit products for Vasco-loy-Ramet Corp.

Mr. Williamson will be headquartered in Hopwood, Pa.

Fred R. Wilson, director of sales for the Du Pont Co.'s Explosives Dept., has been appointed assistant general manager of that division.

Mr. Wilson, a chemical engineering graduate of the University of Virginia, lives in Swarthmore, Pa.

K. M. Patterson has been appointed manager of headquarters sales departments for the Westinghouse Electric Corp.'s Apparatus Div. in East Pittsburgh, Pa.

Mr. Patterson, an electrical engineer, joined Westinghouse in 1923.

Gordon N. Dow has been named general manager and R. Rex Hartup general sales manager of Leschen Wire Rope Div., H. K. Porter Co., Inc.

Mr. Dow will direct operations and Mr. Hartup will be in charge of sales for all products.



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LOCOMOTIVES

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- 2-Jeffrey 13 ton, type MH-110, 36", 42" and 44" Ga.
- 2-Jeffrey 10 ton, type MH-110, 42" and 44" Ga.
- 1-Jeffrey MH-124, 6 ton, 24" overall height.
- 12-Jeffrey, 6 ton, type MH-88, 42", 44" and 48" Ga.
- 4-Jeffrey, 8 ton, type MH-100, 2½" armor plate frames.
- 1-Jeffrey, 6 ton, type 2186, 22" above rail.
- 3-Jeffrey, 4 ton, type MH-96, 42", 44" and 48" Ga.
- 1-O.E., 4 ton, type 823 Locomotive, 22" high.
- 10-O.E., 6 ton, types 801, 803, 821 Locomotives, 42", 44" and 48" Ga.
- 1-O.E., 8 ton, type 822 Locomotive, 44" Ga.
- 3-O.E., 10 ton, type 809 Locomotives, 42", 44" and 48" Ga.
- 2-Goodman, type 33, 6 ton, 44" and 48" Ga.
- 2-Goodman, 8 ton, type 32A, 36", 44" and 48" Ga.
- 3-Westinghouse, type 902, 4 ton, 42" and 48" Ga.
- 2-Westinghouse, type 904, 6 ton, 44" and 48" Ga.
- 2-Westinghouse, type 906, 44" and 48" Ga.
- 2-Westinghouse, type 907, 10 ton, 44" and 48" Ga.

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- 1-Robins Car Shaker.
- 10-Crushers, various sizes.
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- 1-Jay 11RU, rubber tired, Cutter.
- 1-Jeffrey 70 URB Cutter, rubber-tired, Universal Head, low vain.
- 2-Jeffrey 29UC Universal Machines on Cats.
- 1-7AU Sullivan on rubber, Universal head.
- 1-Goodman on cats, 31" overall height.
- 1-Baby Goodman 212's, rebuilt, 250 volt DC.
- 2-Goodman 212 Cutting Machines, 19" high.
- 4-Goodman 312 Cutting Machines, 17" high.
- 4-Goodman 412 Cutting Machines, 19" high.
- 4-Goodman 512's with Bugdusters, like new.
- 4-Goodman 512's rebuilt, or as removed from service.
- 3-Goodman 112's 220/440 volt AC.
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- 1-Jay 7-B Cutting Machine, 250 volt DC.
- 4-Jay 11B Cutting Machines, rebuilt, 35 & 50 H.P.
- 10-Goodman 12AA's and 112AA's, 250 v. DC.
- 2-Goodman 324 Slobbers.
- 2-Goodman 724 Slobbers.
- 6-Jeffrey 35L's like new, 17" high.
- 2-Jeffrey 35L's on low vain trucks.
- 15-Jeffrey 35B's and 35B's.
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- 6-Jay 12BU with Piggy-Back Conveyors
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- 1-Goodman 665 Loader, on cats.
- 1-Goodman 660 Loader, on cats.
- 1-Goodman 460, rebuilt, on truck.
- 2-Jeffrey 61 CLR's, on rubber, 26"
- 3-Jeffrey L-500 Loaders.
- 2-Meyer Whaley No. 3 Automatic Loaders.
- 2-Clarkson Loaders, 26" above rail.

CONVEYORS

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- 2-Goodman 97-C, 30" Conveyors, 1500' long.
- 3-Robins 30" Belt Conveyors, 200' to 2000'.
- 4-Jeffrey 52-B, 30" Drive and Tail Assembly, complete.
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- 3-Goodman 97 HC 30" Drive and Tail Assemblies, complete.
- 8,000' Conveyor Belt, 30".
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- 8-Jeffrey 61AM 12" Chain Conveyors, 300'.
- 2-61EW Elevating Conveyors.
- 2-61WH 15" Room Conveyors, 300'.
- 2-Jay 20" Conveyors, 300'.
- 4-Jay Lodel UN-17 Shakers.
- 10-Goodman G-12½ and G-15 Shakers.

CONVERTERS AND DIESEL PLANTS

- 2-100KW, G.E. TCC-6's, 275 volt, Rotary Converters.
- 1-150KW, G. E. HCC-6, 275 v., Rotary Conv.
- 1-150KW, 6 phase, Allis Chalmers Rotary Converter, 275 DC.
- 1-200KW Allis Chalmers Rotary Converter, 6 phase, 275 DC, perfect.
- 1-200KW, G.E. HCC-6 Rotary Converter, 275 volt DC, newly rewound.
- 1-300KW, G. E. HCC-6 Rotary Conv., 275 DC.
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- 2-500KW Westinghouse Rotary Converters, 275 volt DC.
- 2-200KW Westinghouse Rotary Converters, 275 DC, newly rewound.
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- 1-200KW MG Set, Westinghouse, rebuilt.
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- 1-200KW Allis Chalmers MG Sets, 275 DC volt, excellent, 220-440 AC volt.
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- 1-GMC-671 Diesel with 75KW, 250 volt DC Generator.
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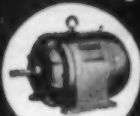
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-ADVERTISERS IN THIS ISSUE-

*Indicates more product information may be found in company advertising appearing in COAL AGE 1958 Mid-July Mining Guidebook and Buying Directory Issue. Check your Guidebook index.

*Aeroquip Corp.	134
*ACF Industries Inc. American Car & Foundry Co.	Third Cover
American Oil Co.	51
*American Pulverizer Co.	87
*American Steel & Wire Div. United States Steel Corp.	68
Atlas Powder Co.	10
*Austin Powder Co.	64
Bethlehem Steel Co.	83, 95
Bird Machine Co.	4
Bixby-Zimmer Engineering Co.	139
Boston Woven Hose & Rubber Co.	33
Broderick & Bascom Rope Co.	29
Carrier Conveyor Corp.	44
Caterpillar Tractor Co.	58-59, 152
*Centrifugal & Mechanical Industries Inc.	138
Coal Age	113
*Compton Inc.	16
Continental Gin Co.	137
Cummins Engine Co.	117, 118-119, 120
Differential Steel Car Co.	109
Dodge Div. Chrysler Corp.	30
Dorr-Oliver Inc.	14-15
Dowty Mining Equipment Ltd.	2-3
*Dravo Corp.	97
Durakool Inc.	138
Ensign Electric Manufacturing Co.	56
Federal Mogul Service Div. Federal-Mogul-Bower Bearings Inc.	77
*Femco Inc.	49
Flexible Steel Lacing Co.	135
Ford Motor Co.	46-47
Galis Electric & Machine Co.	38
Gates Rubber Co.	121
Goodman Manufacturing Co.	27
Goodrich Industrial Products Co. B. F.	1
Goodrich Tire Co. Div. B. F. Goodrich Co.	129
Gulf Oil Corp.	24-25
Guyan Machinery Co.	76
Hamilton Rubber Co.	144
*Hendrick Manufacturing Co.	20
*Heyl & Patterson Inc.	136

International Harvester Co. Construction Equipment Div. (Payhaulers)	22-23
Jeffrey Manufacturing Co.	17, 39
Jones & Laughlin Steel Corp.	34-35
*Joy Manufacturing Co.	8, 60-61, 85, 141
*Kennametal Inc.	133
Kersey Manufacturing Co. Inc.	37
Lee-Norse Co.	31
LeRoi Div. Westinghouse Air Brake Co.	151
*Le Tourneau-Westinghouse Co.	99, 101
*Link-Belt Co.	Fourth Cover
*Long Co.	21
Manhattan Rubber Div. Raybestos-Manhattan Inc.	107
*Manitowoc Engineering Co.	143
Marion Power Shovel Co.	115
Martin Engineering Co.	50
*McLanahan & Stone Corp.	142
*McNally Pittsburg Manufacturing Co.	132
Coal Age	113
Metallurgical Products Div. General Electric	19
*Mine Safety Appliances Co.	Second Cover
*National Malleable & Steel Castings Co.	127
National Mine Service Co.	66-67
*Nolan Co.	42
Ohio Brass Co.	43
Okonite Co.	53
Porter Co. Inc. H. K.	
*Leschen Wire Rope Div.	40
Thermoid Div.	41
Post-Glover Electric Co.	140
Republic Steel Corp.	88-89
Robbins Machine & Mfg. Co. Inc.	125
*Roberts & Schaefer Co.	100
Roebbing Sons Corp. John A.	18

Sanford-Day Iron Works	78-79
*Scandinavia Belting Co.	63
Searchlight Section	145-149
Shell Oil Co.	54-55
Simplex Wire & Cable Co.	45
Socony Mobil Oil Co.	6
Spencer Chemical Co.	36
Stamler Corp. W. R.	65
Stenberg Manufacturing Corp.	112
*Sun Oil Co.	131
United States Rubber Co. (Mechanical Goods Div.)	123
*United States Steel Corp.	12-13
Vascoloy-Ramet Corp.	57
*Victaulic Co. of America	52

PROFESSIONAL SERVICES 145

CLASSIFIED ADVERTISING F. J. Eberle, Business Mgr.

EMPLOYMENT OPPORTUNITIES ... 145

EQUIPMENT (Used or Surplus New) For Sale 146-149

WANTED Equipment 148

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"DUSTLESS" S 20 STOPER is available with 28-, 46-, and 64-in. feeds... weights; 65, 78, and 88 lbs. It can be used for fast, dustless roof-bolting wherever a man can crawl!



LIGHT

SHORT

**LE ROI
S 20
STOPER**

DUSTLESS

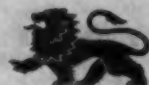
• drills in 26-in. coal • delivers lightweight power • cuttings never pass through stoper

The thousands used in coal mines prove that the Le Roi S 20 Dust-Collecting Stoper is the shortest, lightest, and the only practical stoper for 26-in. seams!

Le Roi's Vac-Nu-Matic® dust-collection is fast, positive — reduces wear on men and machines. Perfect dust removal minimizes rotational drag, eliminates stuck steel, and speeds drilling even in soft, wet formations. The S 20 removes dust through the chuck housing — not through the stoper — drills deeper with one steel change than conventional stopers can with two! Its design permits chuck changes without dismantling the machine.

Call your Le Roi distributor for more information — and a demonstration. Or write to Le Roi Division, Westinghouse Air Brake Co., Milwaukee 1, Wisconsin.

**LE ROI
NEWMATIC®
.....
AIR TOOLS**



PORTABLE AND TRACTAIR® AIR COMPRESSORS • STATIONARY AIR COMPRESSORS • AIR TOOLS
Distributed in the Coal Fields by: Acme Machinery Company, Huntington, West Virginia, and Equipment Service Company, Inc., Birmingham, Alabama.

AT-003

ANOTHER COAL STRIP-MINING REPORT ON **THE COST-CUTTING D9**



IF YOU want a money-saving tool for strip mining, then see what the Bolt Mining Co. of Beckley, West Virginia, is doing with the Cat D9 Tractor equipped with No. 9 Ripper and No. 9A Bulldozer pictured above.

The company bought this D9 primarily for ripping a cover of shale over a bituminous coal seam of 48". Result: efficient removal of approximately 6-7,000 yd. of overburden per 20-hour day.

According to James C. Justice, general manager, it would take four men with jackhammers or two wagon drills to get the same production—and there would be the added cost of explosives.

Bolt uses another D9, plus four D8s and a D7, for removing overburden and for maintaining haulage. In this application: "Under ideal conditions we have found

that the D9 can move dirt at about the same price as a 5-yd. shovel," says Mr. Justice. No wonder the firm is standardizing on Caterpillar!

Ripping or 'dozing, the Caterpillar D9 Tractor is ready to give you remarkable cost savings and keep production high. Many strip-mine owners find that a D9, by reducing costs, completely pays for itself in a few months. And now the D9 is available with *lifetime* lubricated rollers—a Caterpillar exclusive!

You could be missing out on a machine valuable to your operation. Call your Caterpillar Dealer soon and have him bring the D9 to your job for a demonstration.

Caterpillar Tractor Co., Peoria, Illinois, U.S.A.

CATERPILLAR

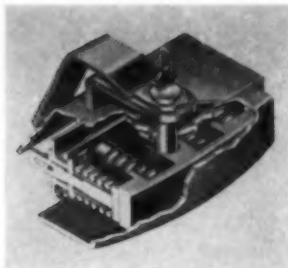
Caterpillar and D9 are Registered Trademarks of Caterpillar Tractor Co.

FIND YOUR CATERPILLAR DEALER IN THE

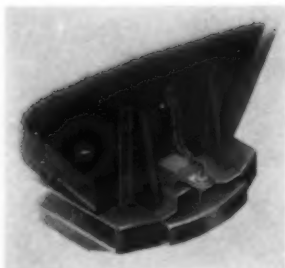
YELLOW PAGES



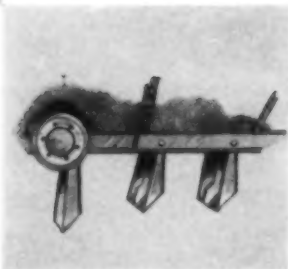
**D9—MODERN WAY TO HIGH
PRODUCTION, LOW COST**



QCF DOUBLE-ACTION SPRING BUMPER



QCF WELDED END SILL MEMBER



QCF LUBRICATED DROP-BOTTOM DOORS

QCF EXTRA-PERFORMANCE COMPONENTS increase haulage efficiency

**QCF
LOAD SUPPORT
WHEELS**



Every **QCF** Constant Haulage Mine Car—drop-bottom, end dump, or rotary dump—pays off in extra productivity, lower maintenance costs. No matter what type or size your operations need, from 20 to 30 tons or more, there's a service-proved **QCF** design that's right for the job. Why not discuss your haulage problems with an experienced **QCF** representative. Just contact the nearest **QCF** sales office or write department CA-5.

*Write for this bulletin describing all types of **QCF** Mine Cars available on request.*



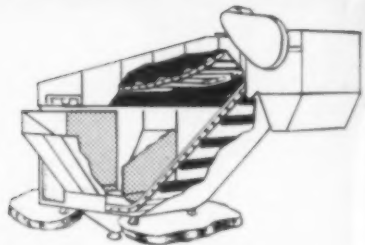
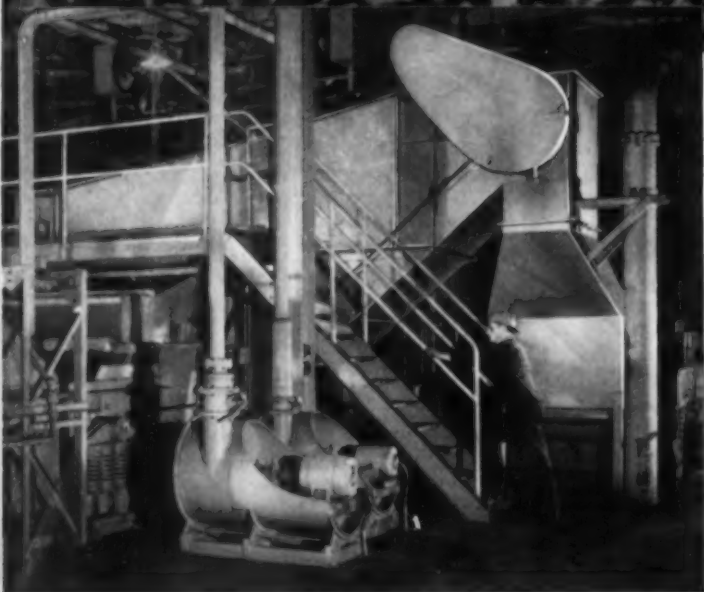
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Link-Belt coal washers deliver your product

uniformly clean



AT CLINCHFIELD

LINK-BELT TANK-TYPE FLOAT-SINK CONCENTRATOR satisfies cleaning requirements of Clinchfield Coal Company's new preparation plant (Clinchfield, Russell County, Va.). This coal washer utilizes the heavy-media separation process in a magnetite and water mixture. Efficient for extremely high or low specific gravity separation . . . when a large percentage of coal is near the separation gravity . . . when amount of impurities in feed fluctuates or product must be quickly changed. Cleans larger sizes, minimizing manual picking.

PICTURED are just two of many progressive mine operations in which Link-Belt has furnished the answer to particular coal cleaning problems. Whether your operation is best suited to the Link-Belt heavy-media system or the Link-Belt air-pulsated wash box system—impurities are removed at low cost . . . ash percentages are lowered.

Call your Link-Belt office today and ask for Book 2655. Our specialists will work with your engineers in determining the right equipment for a cleaner, more marketable coal at lower cost.

LINK-BELT

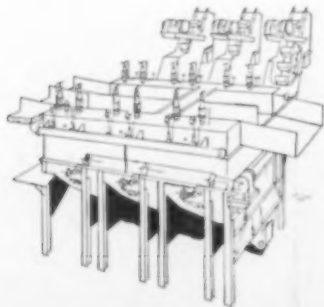


COAL PREPARATION AND HANDLING EQUIPMENT

LINK-BELT COMPANY: Chicago 9, Birmingham 9, Cleveland 20, Denver 2, Detroit 4, Huntington 9, W. Va., Indianapolis 6, Kansas City 8, Mo., Louisville 2, Pittsburgh 13, Seattle 4, St. Louis 1, Salt Lake City 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World.

15-558

AT JOANNE



LINK-BELT AIR PULSATED WASH BOX was the choice of Joanne Coal Company for its metallurgical coal plant located at Rachel, West Va. Extremely flexible for high-capacity cleaning of sized or unsized coal, Link-Belt air-pulsated washers are available in single and dual bed models to satisfy all capacity requirements. The dual bed model (pictured) has higher capacity due to increased washing bed width and individual bed controls . . . provides sharper separation over the entire washing area. Both models can incorporate the new Aeropoise refuse control for completely automatic refuse discharge.



